

From: Roddy, Elizabeth A CIV USN NAVFAC SW SAN CA (USA)
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Sent: Tuesday, January 26, 2021 3:56 PM
To: Praskins, Wayne [Praskins.Wayne@epa.gov]; Juanita.bacey@dtsc.ca.gov; Han, Terry@CDPH [Terry.Han@cdph.ca.gov]
CC: Stoick, Paul T CIV USN NAVFAC SW SAN CA (USA) [paul.stoick@navy.mil]; Robinson, Derek J CIV USN NAVFAC SW SAN CA (USA) [derek.j.robinson1@navy.mil]; Liscio, Matthew P CIV USN NAVSEA DET RASO VA (USA) [matthew.liscio@navy.mil]
Subject: N62473-17-D-0006 CTO: N6247318F5065 Parcel G - Soil Data Package TU-99 & TU-77
Attachments: CTO5065_RSY1Use1_DataPackage_01262021.pdf;
CTO5065_RSY1Use1_DataPackage_01262021.pdf;
CTO5065_RSY1Use2_DataPackage_01222021.pdf

Dear Wayne, Nina and Terry,

To support the agencies oversight/split sampling effort and as a courtesy of information sharing, attached you will find Soil Data Package 01 of 06 for Parcel G Phase 1 TU-99 and Soil Data Package 01 and 02 for Parcel G Phase 1 TU-77.

Please let me know if you have any questions.

Very Respectfully,

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Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report							
RSY Pad: RSY 11 Use 1	Soil Origin: TU-099A ESU						
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/21/2021						

Systematic Soil Sample Data: RSY 11 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU099A-001	1	Systematic	9,290	15,359	0.269	0.00248	0.0616
HPPG-ESU-TU099A-002	2	Systematic	9,207	15,359	0.588	-0.0542	N/A
HPPG-ESU-TU099A-003	3	Systematic	8,801	15,359	0.0203	0.0180	N/A
HPPG-ESU-TU099A-004	4	Systematic	9,992	15,359	0.472	0.0200	N/A
HPPG-ESU-TU099A-005	5	Systematic	9,020	15,359	0.314	-0.00182	N/A
HPPG-ESU-TU099A-006	6	Systematic	8,866	15,359	0.319	0.0765	N/A
HPPG-ESU-TU099A-007	7	Systematic	8,543	15,359	0.438	0.0160	N/A
HPPG-ESU-TU099A-008	8	Systematic	10,413	15,359	0.0427	-0.0442	N/A
HPPG-ESU-TU099A-009	9	Systematic	9,839	15,359	0.384	-0.0316	N/A
HPPG-ESU-TU099A-010	10	Systematic	8,643	15,359	0.339	-0.0464	N/A
HPPG-ESU-TU099A-011	11	Systematic	9,190	15,359	0.331	0.0126	0.199
HPPG-ESU-TU099A-012	12	Systematic	9,672	15,359	0.249	0.0243	N/A
HPPG-ESU-TU099A-013	13	Systematic	10,005	15,359	0.414	0.0270	N/A
HPPG-ESU-TU099A-014	14	Systematic	9,786	15,359	0.359	0.0246	N/A
HPPG-ESU-TU099A-015	15	Systematic	8,860	15,359	0.126	0.0198	N/A
HPPG-ESU-TU099A-016	16	Systematic	9,793	15,359	0.380	0.0114	N/A
HPPG-ESU-TU099A-017	17	Systematic	9,464	15,359	0.320	-0.0547	N/A
HPPG-ESU-TU099A-018	18	Systematic	9,980	15,359	0.465	0.0186	N/A
HPPG-ESU-TU099A-019	19	Systematic	9,754	15,359	0.463	0.0252	N/A
HPPG-ESU-TU099A-020	20	Systematic	10,212	15,359	0.292	0.0232	N/A
HPPG-ESU-TU099A-021	21	Systematic	9,573	15,359	0.350	-0.0429	-0.0198
HPPG-ESU-TU099A-022	22	Systematic	9,741	15,359	0.0422	0.0324	N/A
HPPG-ESU-TU099A-023	23	Systematic	9,818	15,359	0.332	-0.0448	N/A
HPPG-ESU-TU099A-024	24	Systematic	9,360	15,359	0.403	0.0145	N/A
HPPG-ESU-TU099A-025	25	Systematic	9,975	15,359	0.465	0.00108	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
					Maximum	0.588	0.0765
					Mean	0.327	0.0019
					Median	0.339	0.0145
					Minimum	0.0203	-0.0547
					Standard Deviation	0.1424	0.0336

Biased Soil Sample Data: RSY 11 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*							
HPPG-ESU-TU099A-B-001	1	Biased	11,212	15,359	0.621	-0.0273	0.0492

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11052020-PG-ROV-279	11/05/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11062020-PG-JSS-284	11/06/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11062020-PG-JSS-282	11/06/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11072020-PG-JSS-286	11/07/2020	3x3	10/09/2021	271420

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 11 Use 1
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 53 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
2) One-minute static follow-up measurements with the RS-700 were collected at 53 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-66. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 39-73). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for ⁹⁰ Sr. Strontium-90 results are also included in the TestAmerica sample results report (pages 67-102). Samples HPPG-F-029 and HPPG-F-030 are field duplicates, correlating to systematic samples -001 and -007. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 103-116). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
Conclusions:
In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.
RSY 11 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-099A ESU.
APTIM requests RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be used as backfill for TU-099.

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-11-U1					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	26.07	12.79	13.02	3.66
ROI-06		46.10	128.31	88.92	88.21	10.89
ROI-07		43.08	106.26	69.10	69.13	9.24
ROI-08		75.15	164.36	111.90	111.26	12.48
ROI-10		1,972.68	2,700.34	2,285.16	2,275.82	120.00

Statistical Summary Reference Background

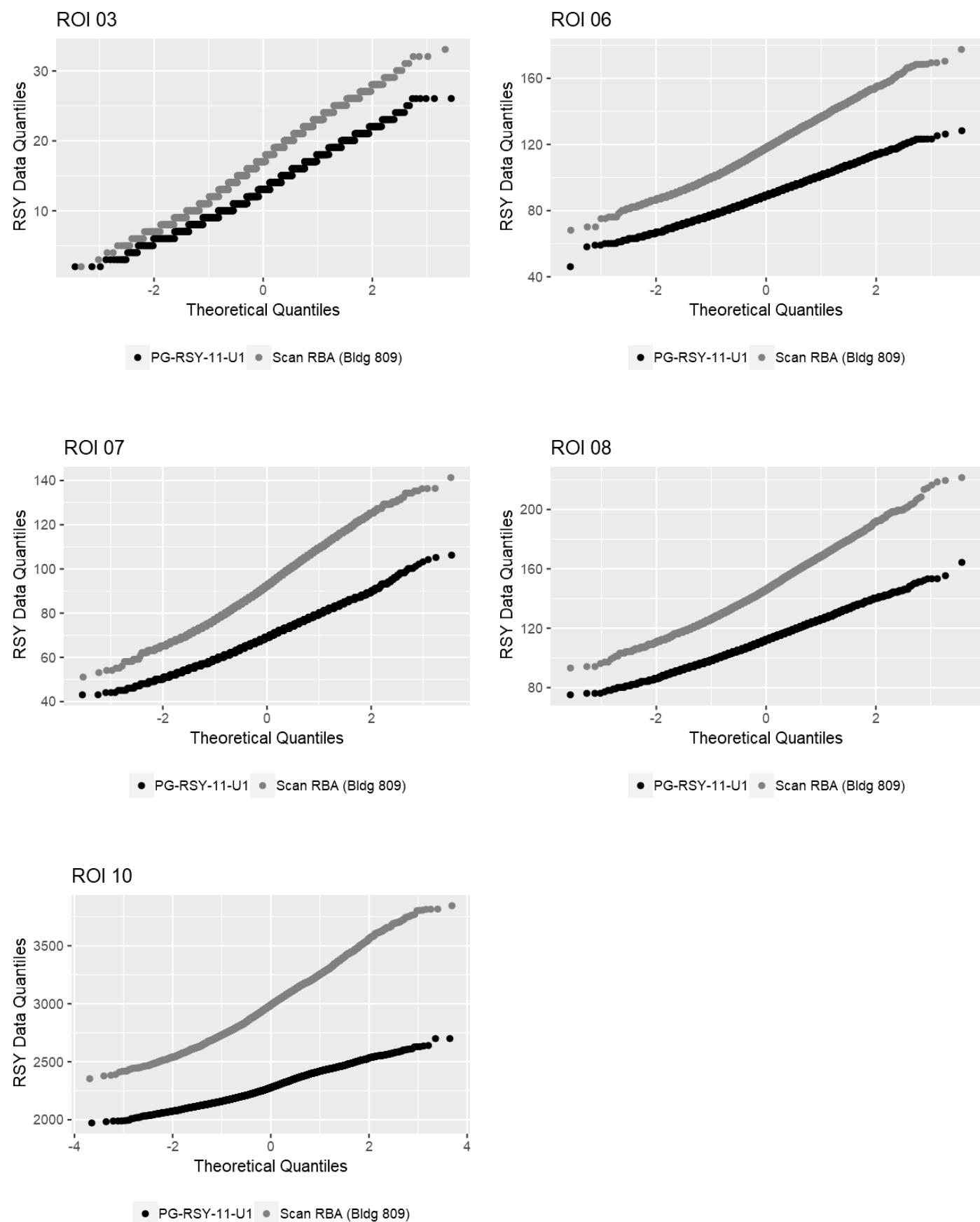
TYPE	Scan RBA (Bldg 809)					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	33.08	16.21	16.04	4.13
ROI-06		68.15	177.45	117.58	117.26	15.50
ROI-07		51.11	141.33	92.34	91.24	13.43
ROI-08		93.19	221.48	146.24	145.30	18.21
ROI-10		2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-11-U1	3876
Scan RBA (Bldg 809)	4632

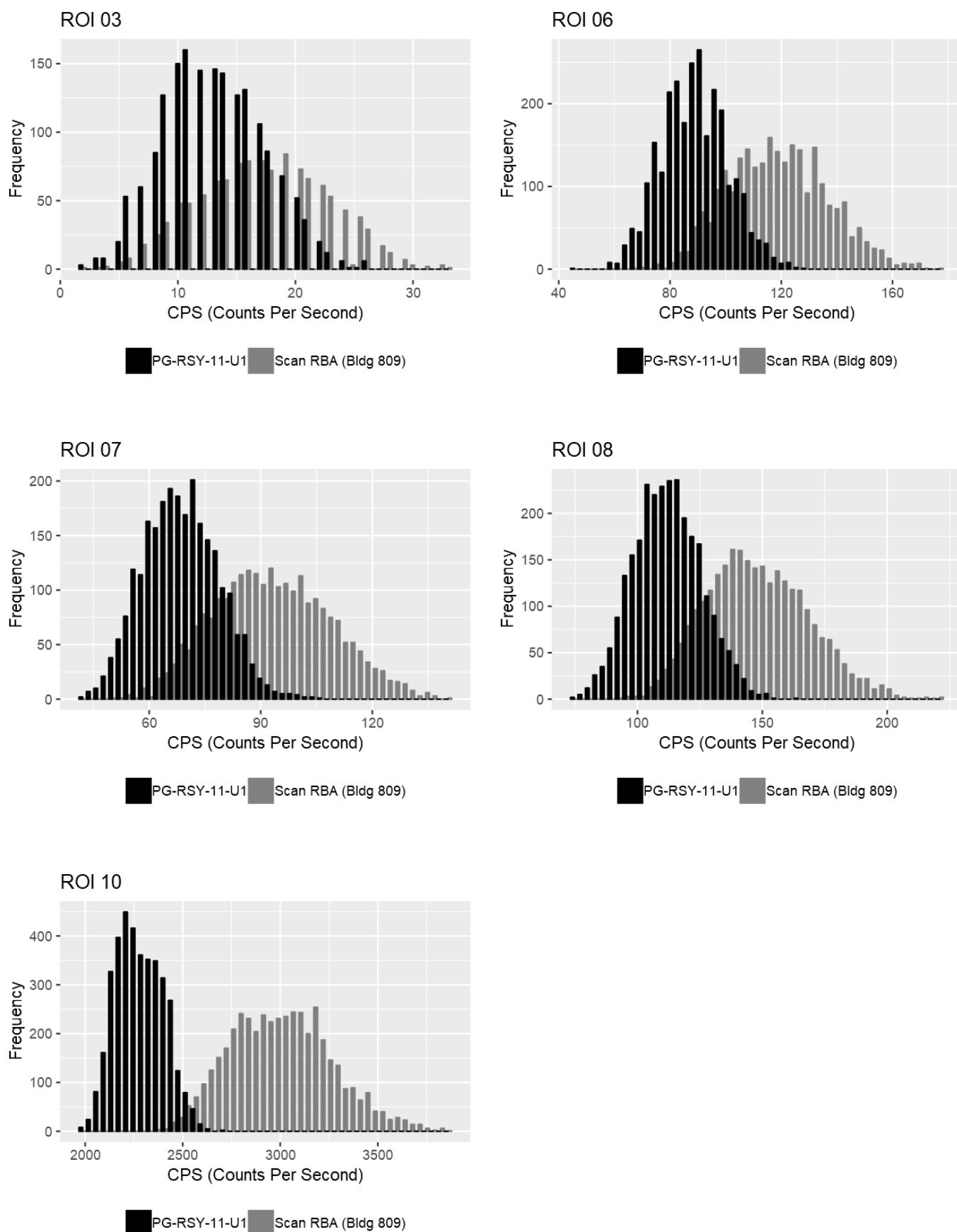
Soil Scan Statistics

Normal Q-Q Plots



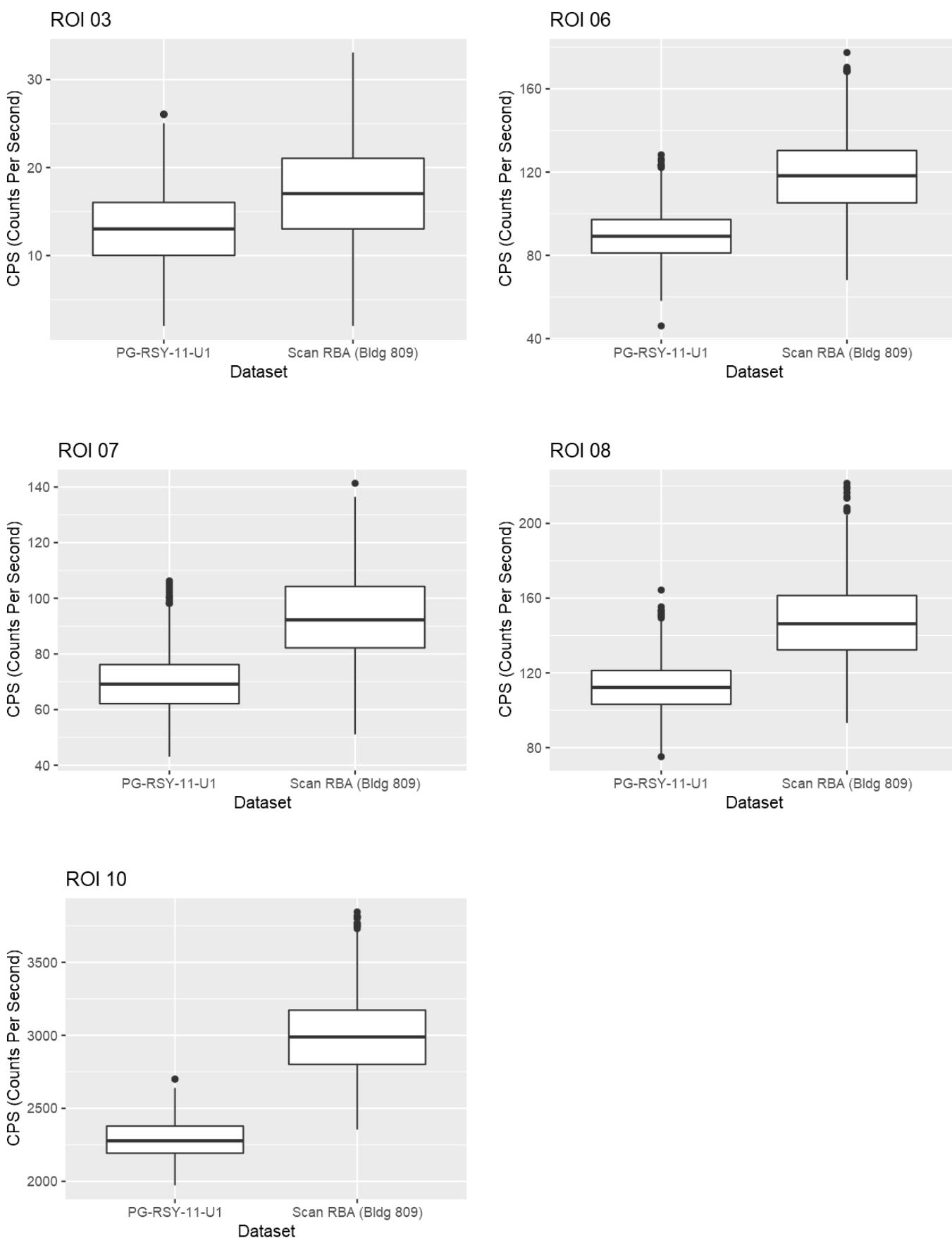
Soil Scan Statistics

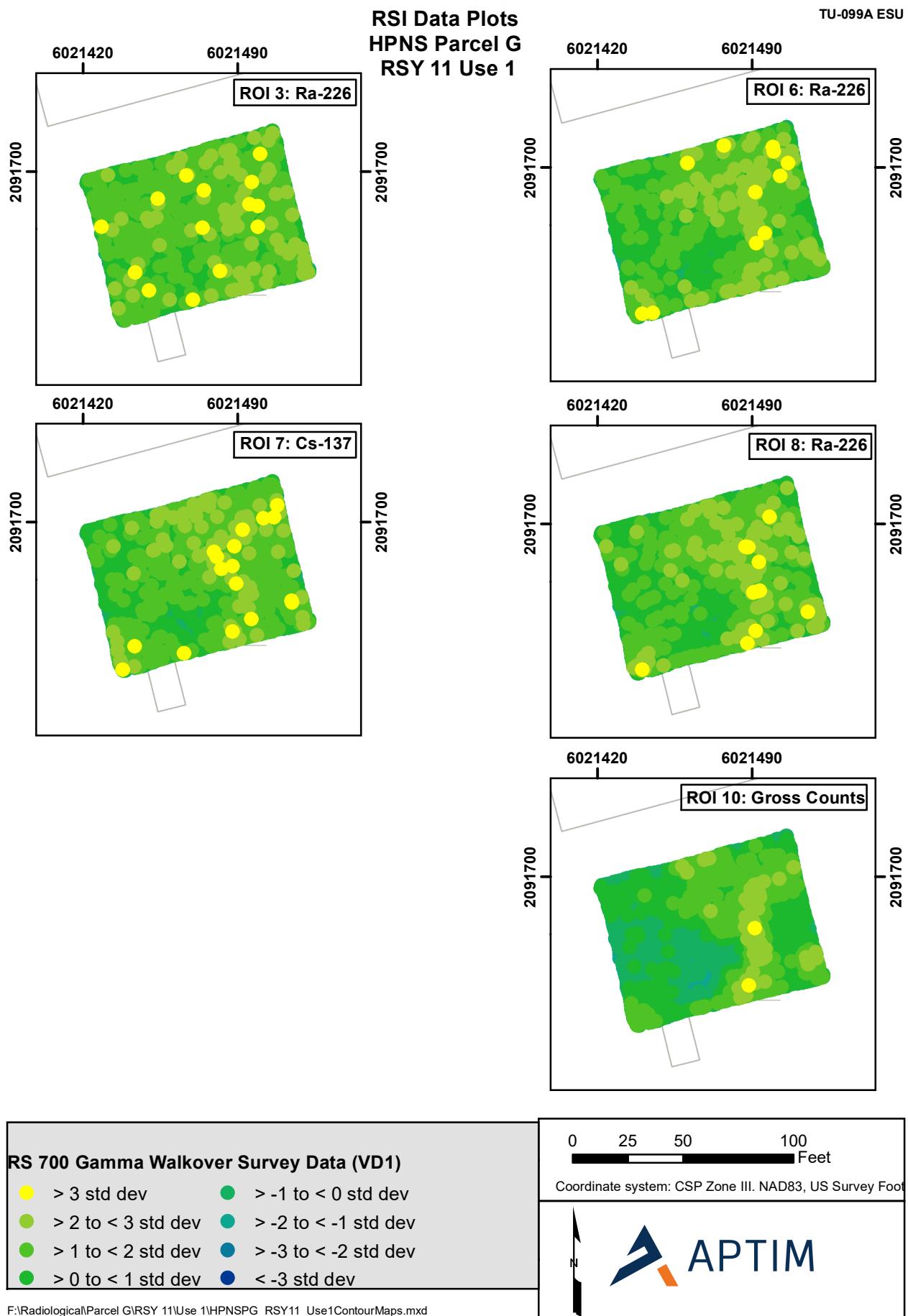
Histograms

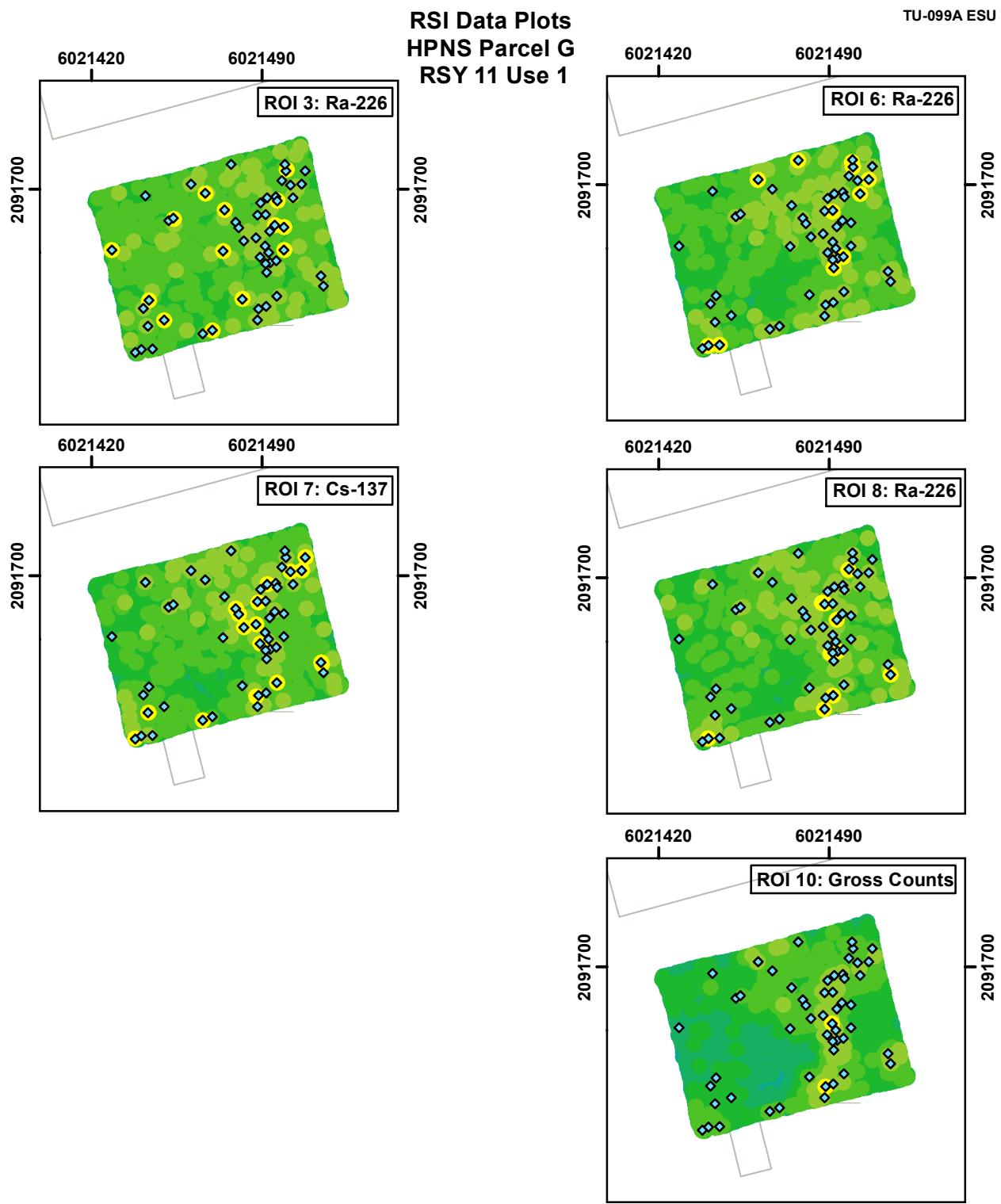


Soil Scan Statistics

Box Plots





**RS 700 Gamma Walkover Survey Data (VD1)**

- ◊ Follow-Up Locations
- ◆ > 3 std dev
- ◆ > 2 to < 3 std dev
- ◆ > 1 to < 2 std dev
- ◆ > 0 to < 1 std dev
- ◆ > -1 to < 0 std dev
- ◆ > -2 to < -1 std dev
- ◆ > -3 to < -2 std dev
- < -3 std dev

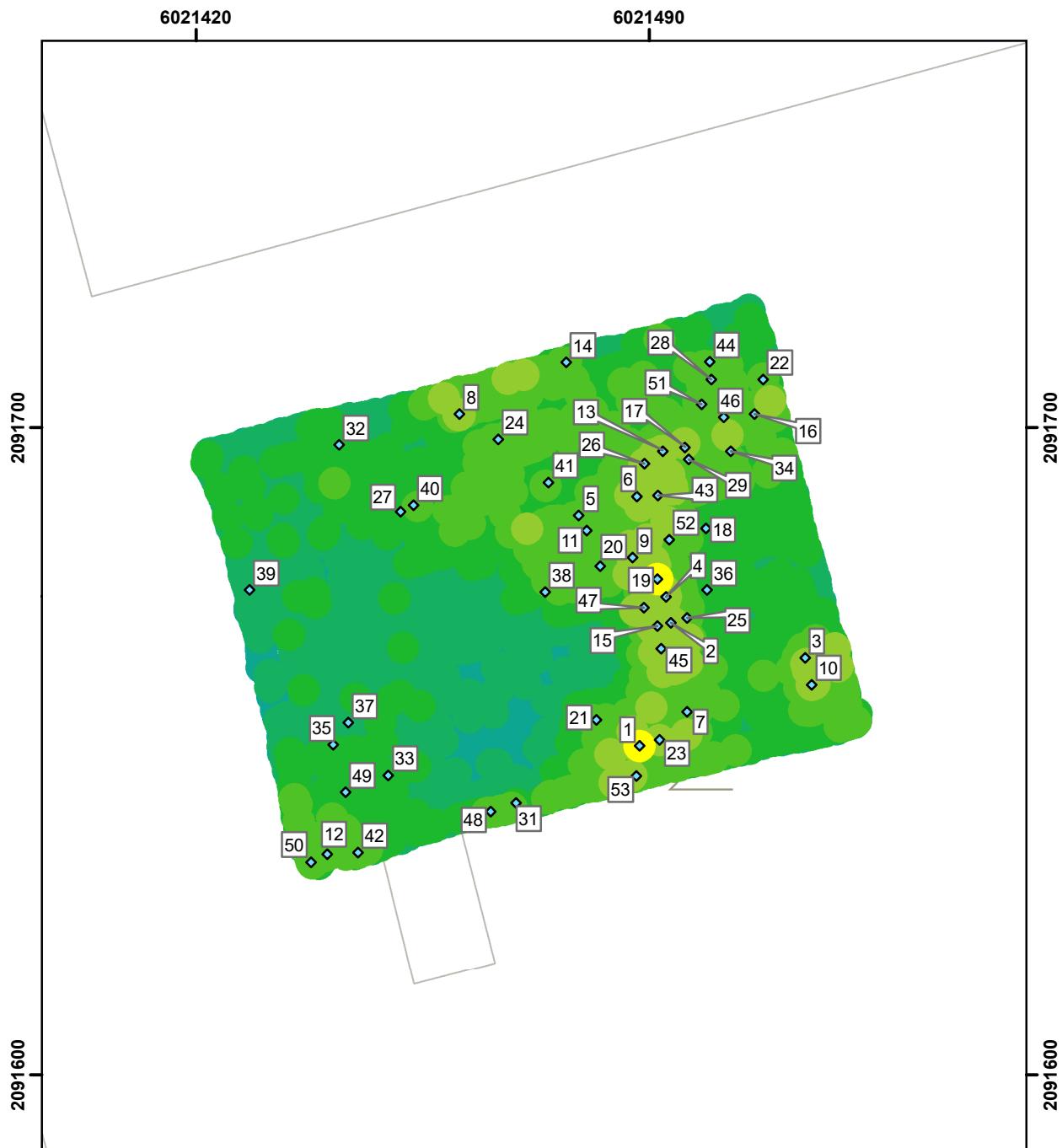
0 25 50 100
 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



**Follow-Up Static Survey
HPNS Parcel G
RSY 11 Use 1**

TU-099A ESU



RSY 11 Use 1 (VD1, ROI 10 Gross Gamma)

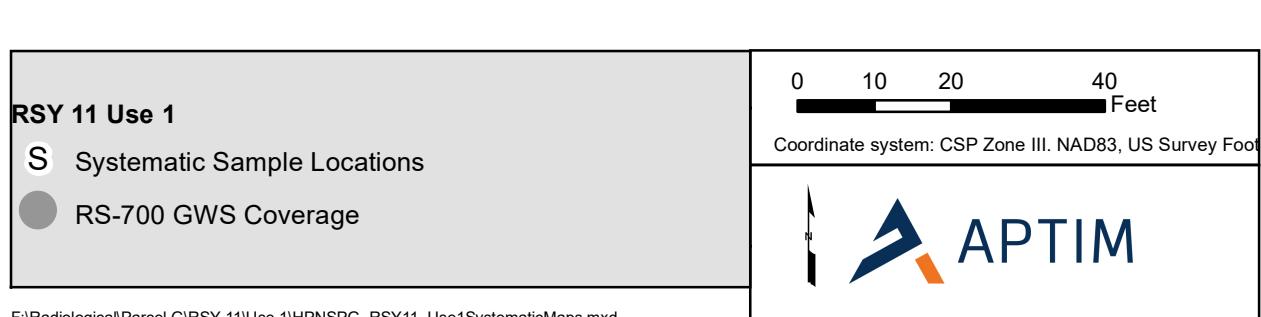
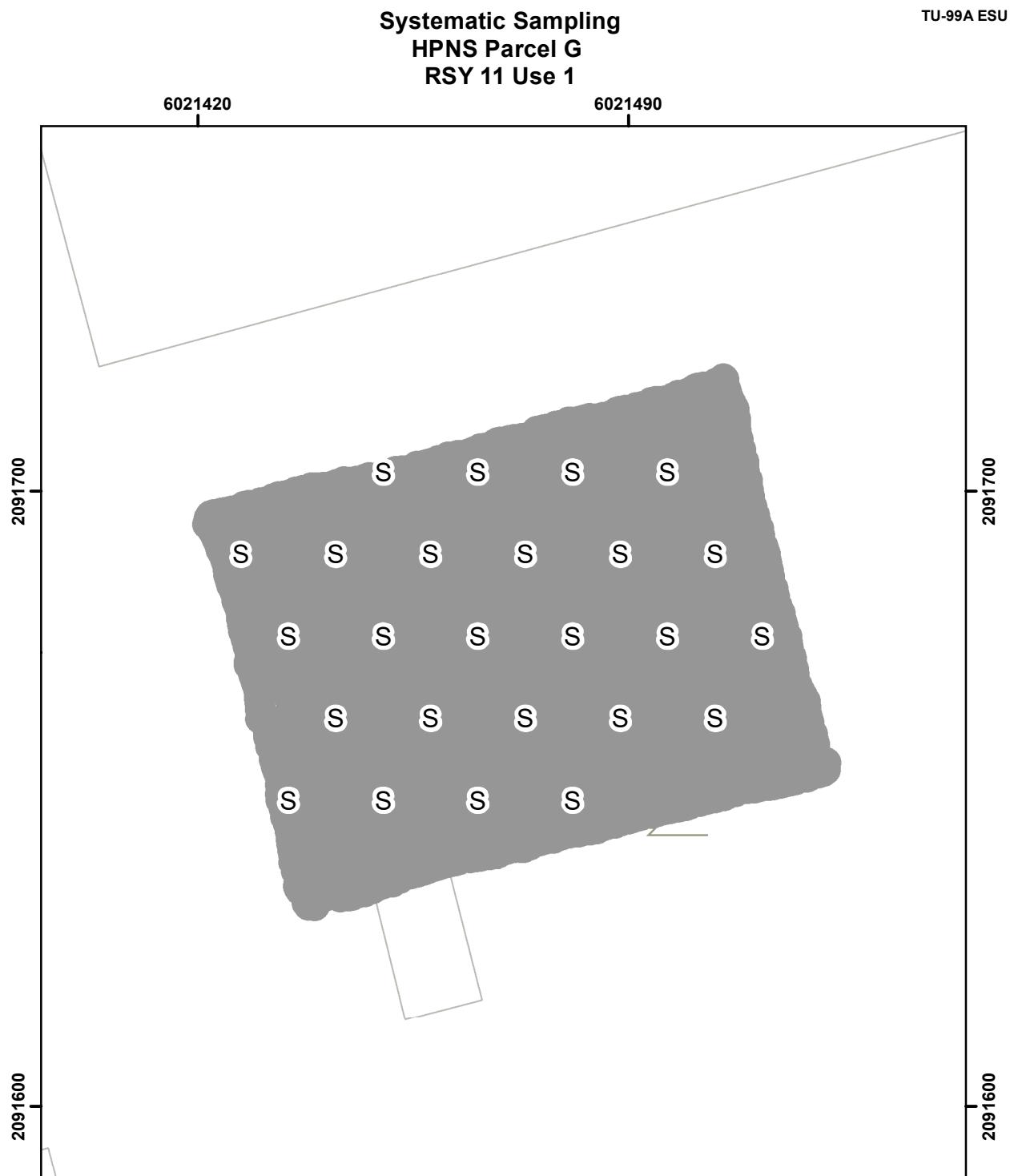
- ◆ Follow-Up Locations
- > 1 to < 2 std dev
- > -2 to < -1 std dev
- > 3 std dev
- > 0 to < 1 std dev
- > -3 to < -2 std dev
- > 2 to < 3 std dev
- > -1 to < 0 std dev
- < -3 std dev

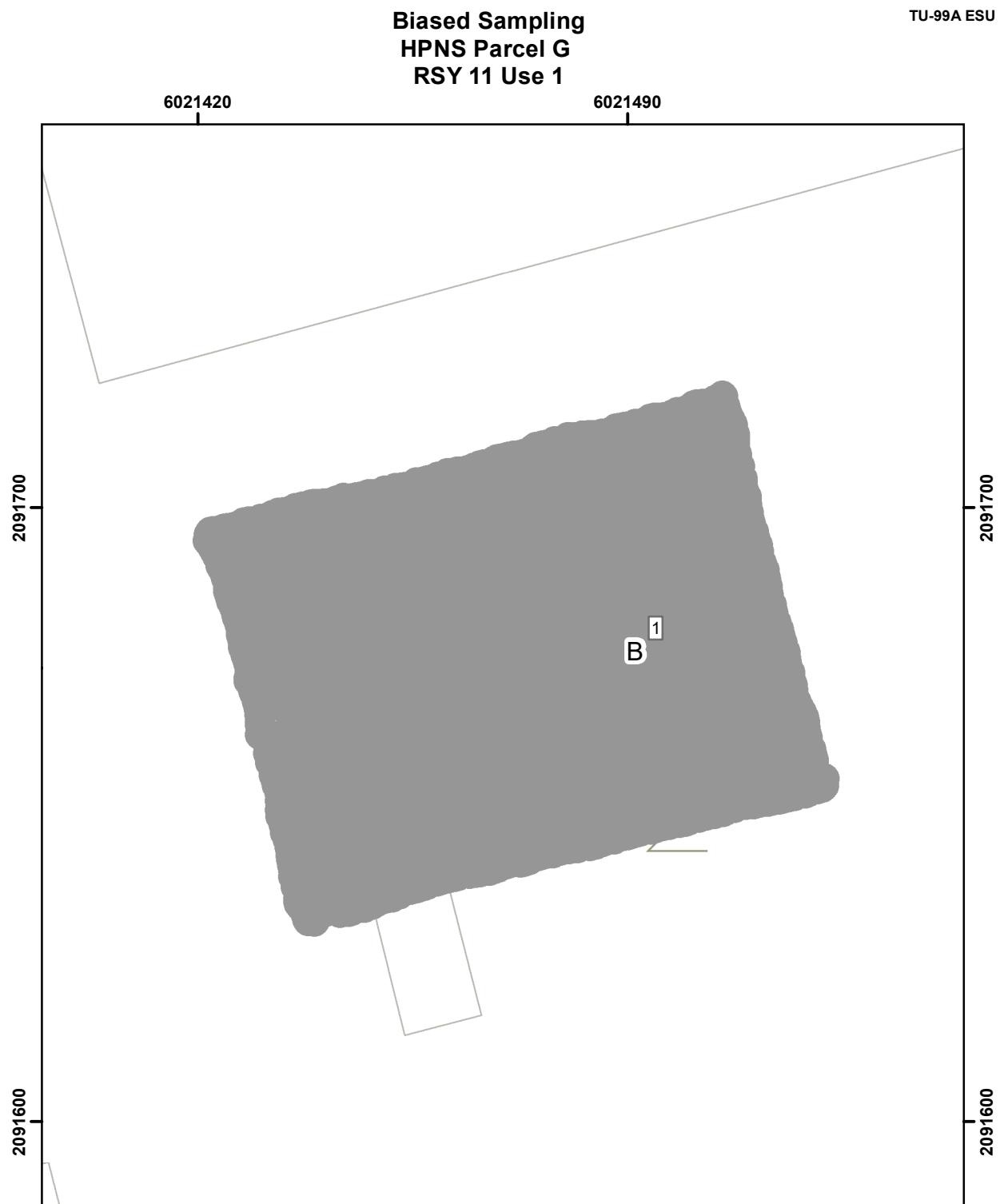
25 12.5 0 25 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot



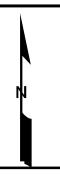
APTIM



**RSY 11 Use 1**

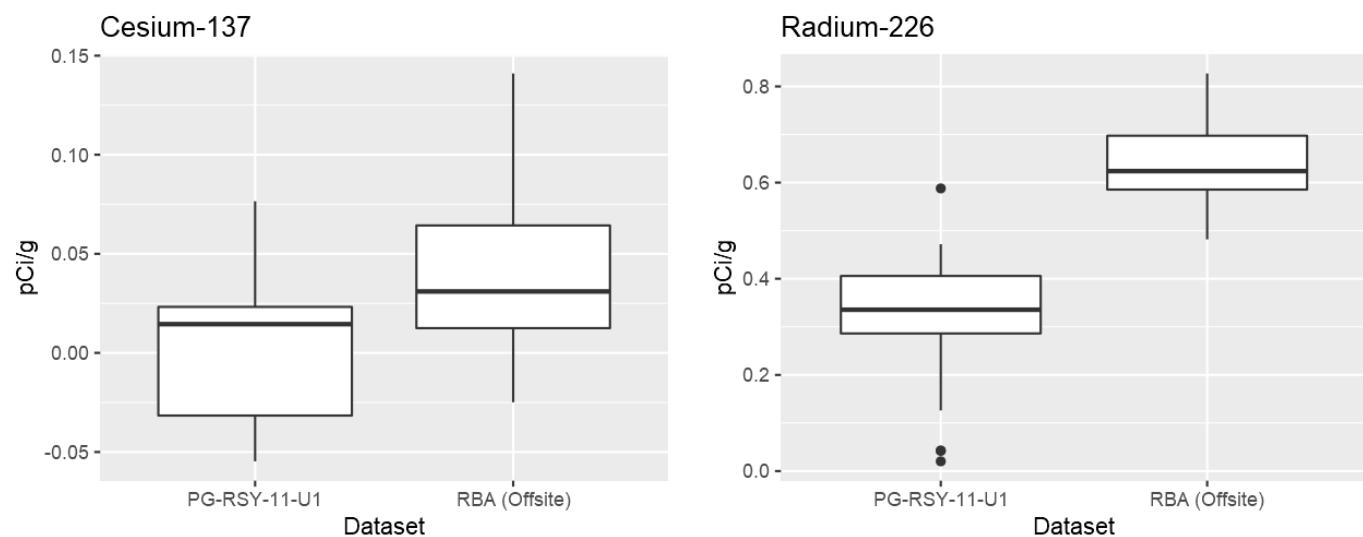
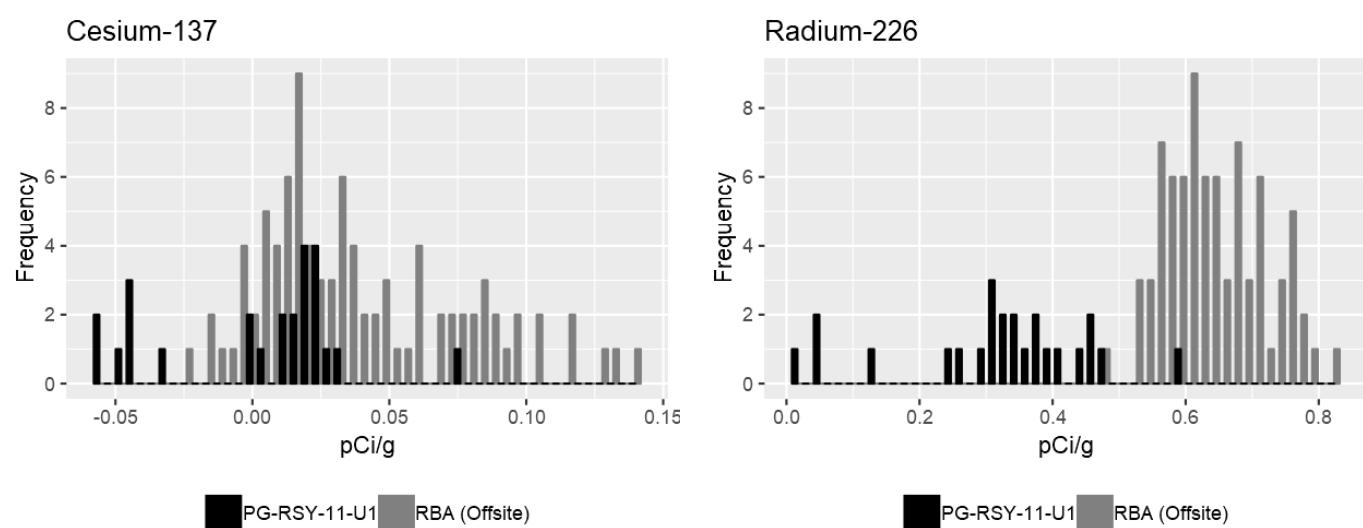
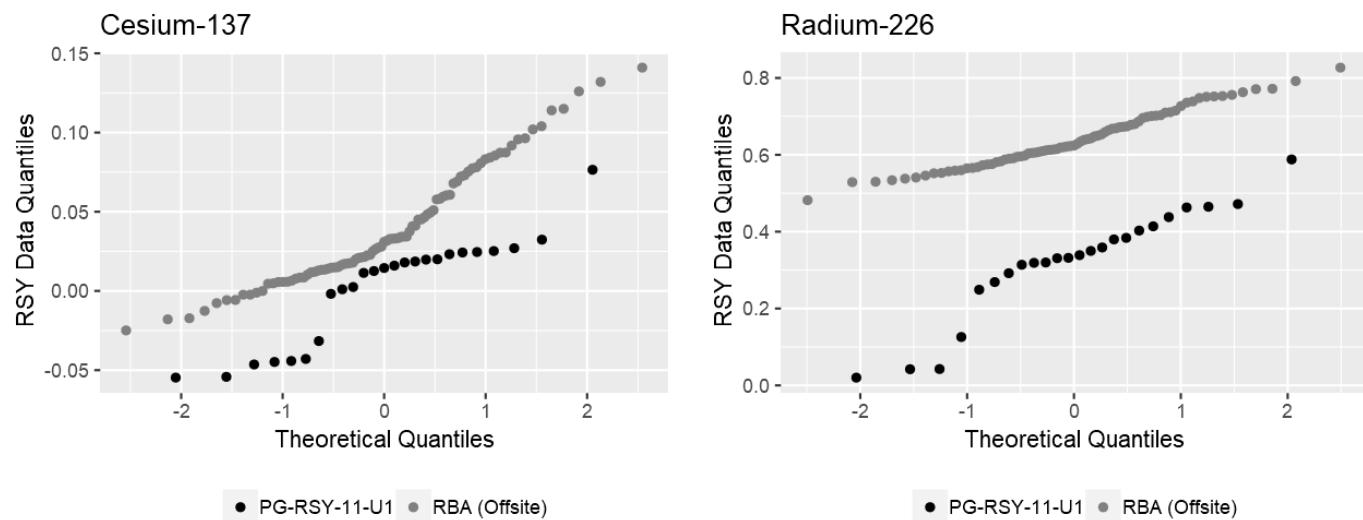
- B Biased Sample Location
● RS-700 GWS Coverage

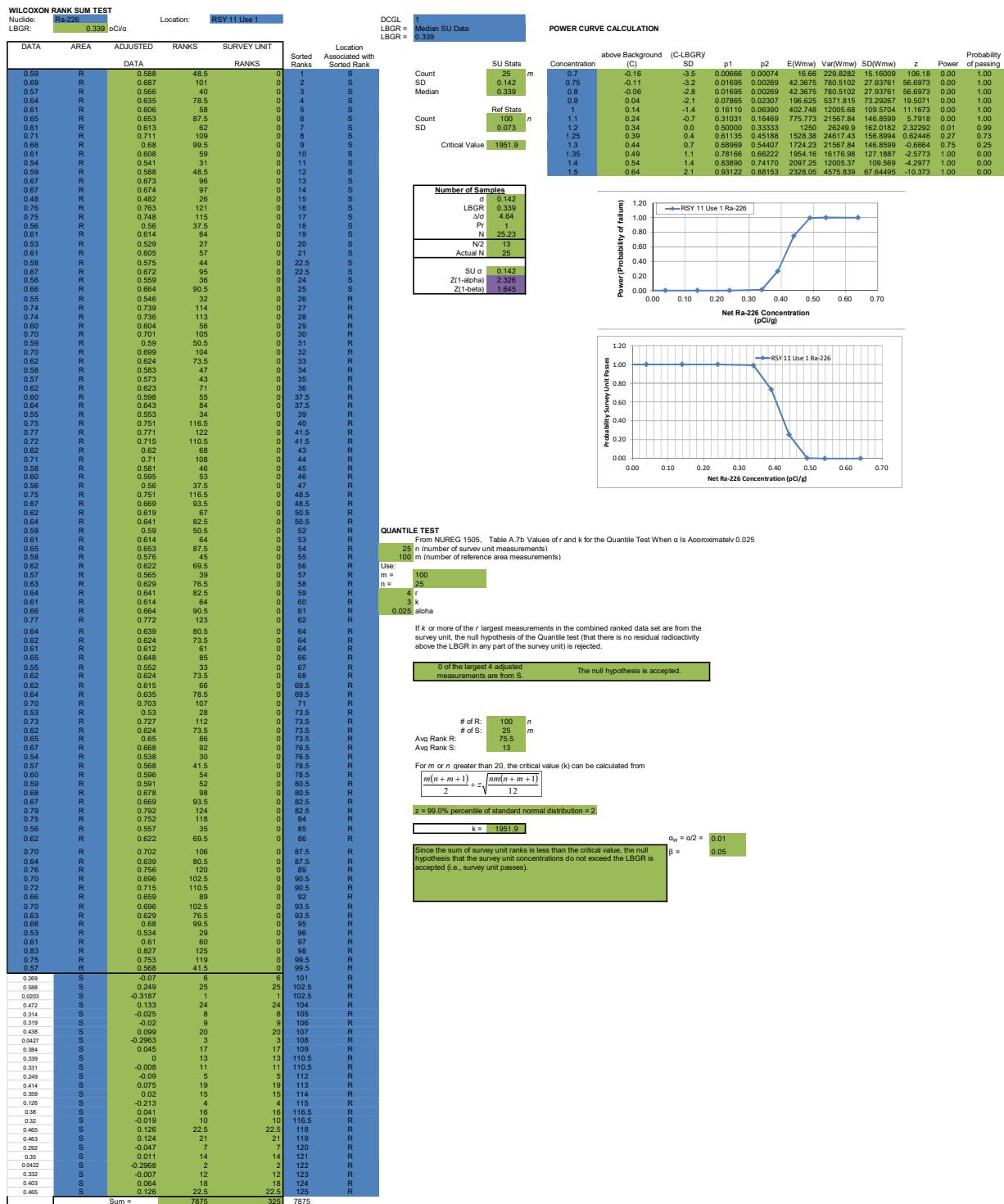
25 12.5 0 25 Feet
Coordinate system: CSP Zone III, NAD83, US Survey Foot



APTIM

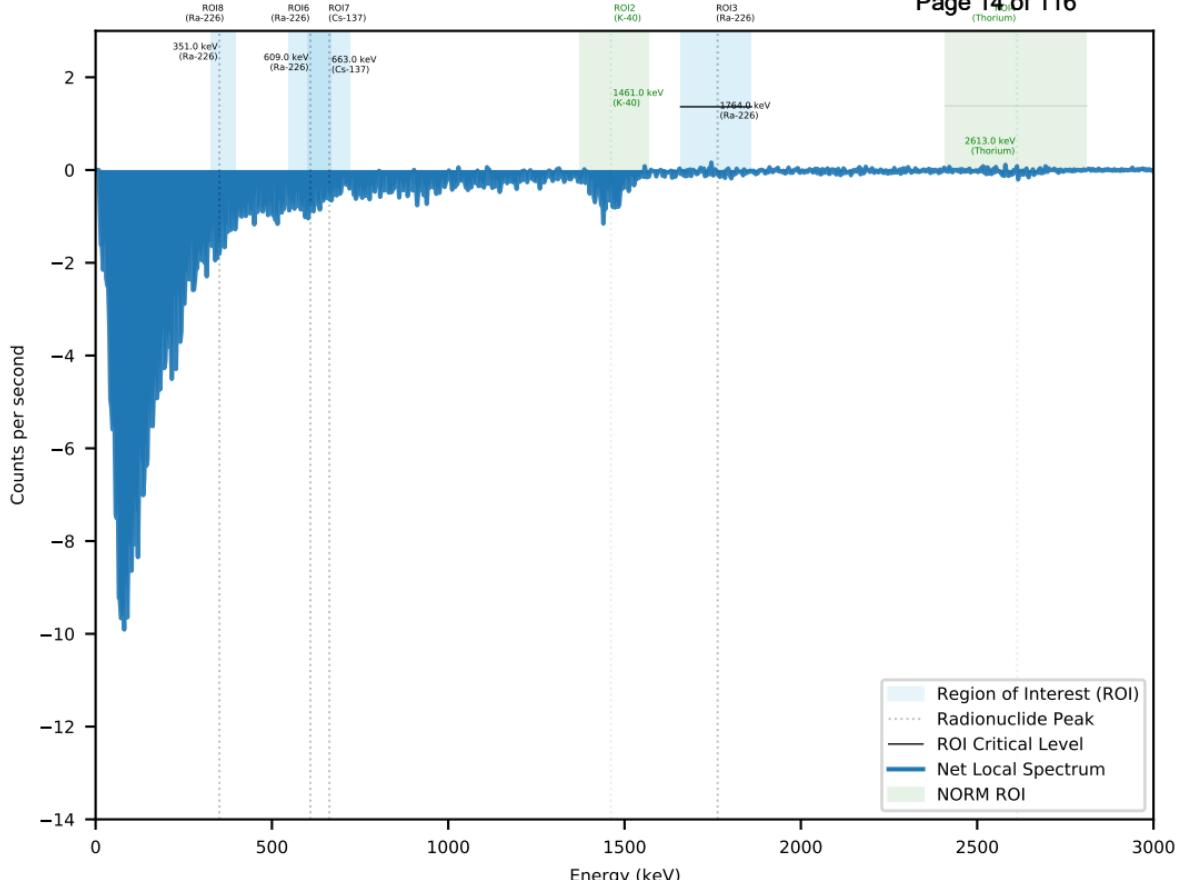
Soil Sample Statistics





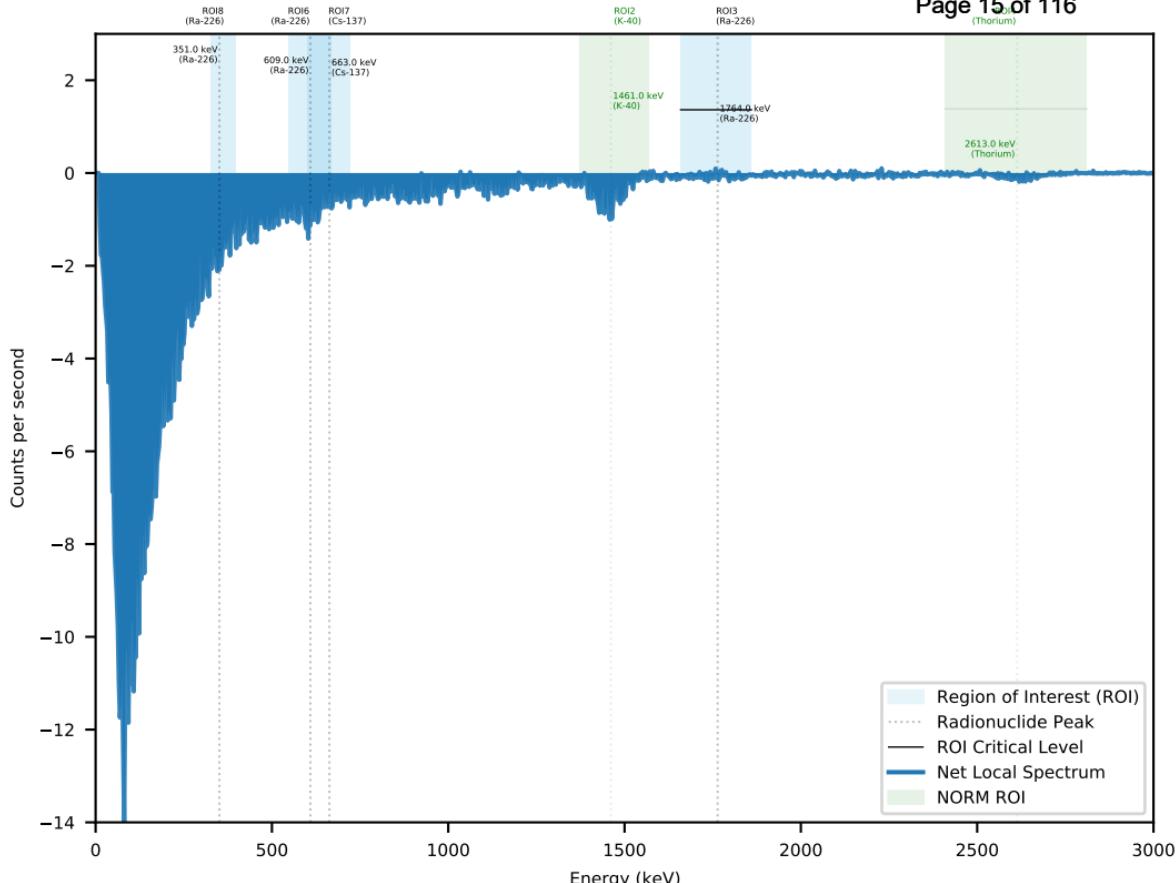
Net Gamma Spectrum, Static Location: 1

Page 14 of 116
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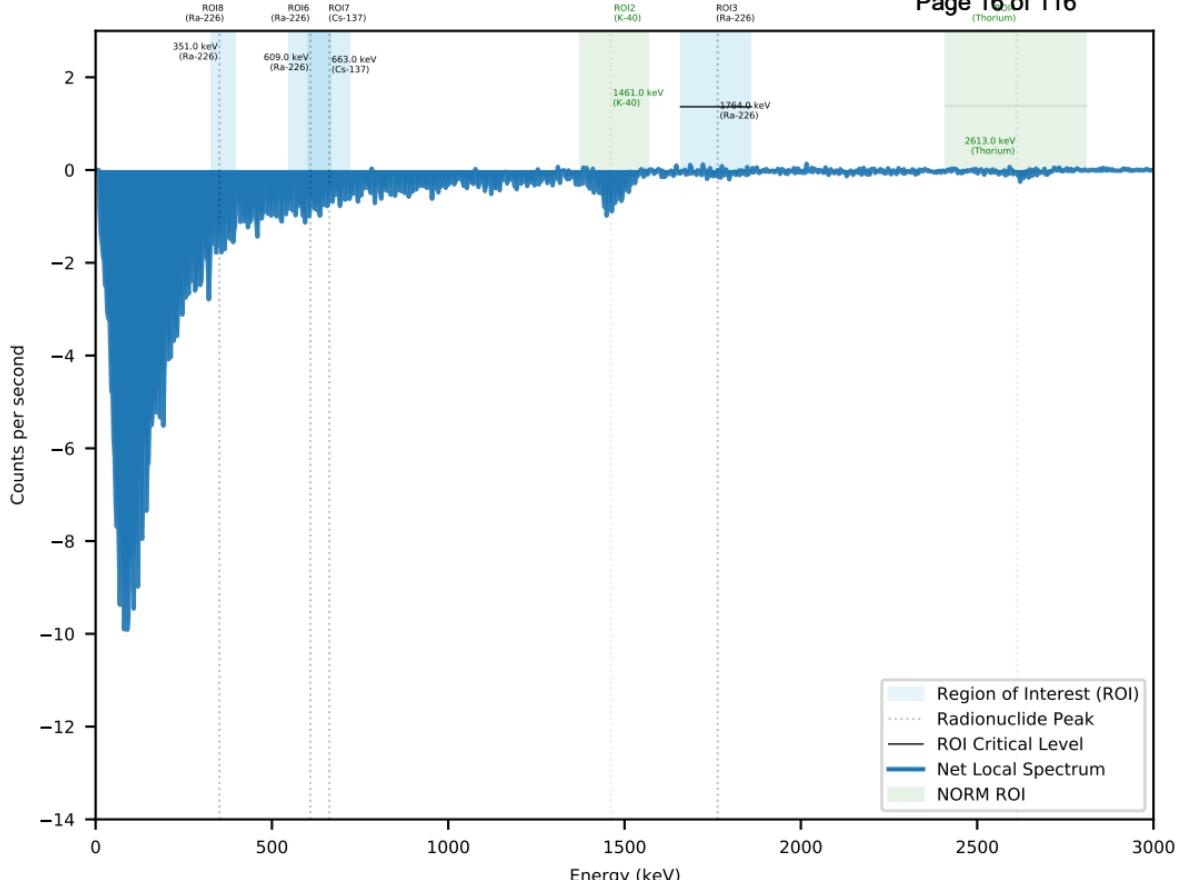
Net Gamma Spectrum, Static Location: 2

Page 15 of 116
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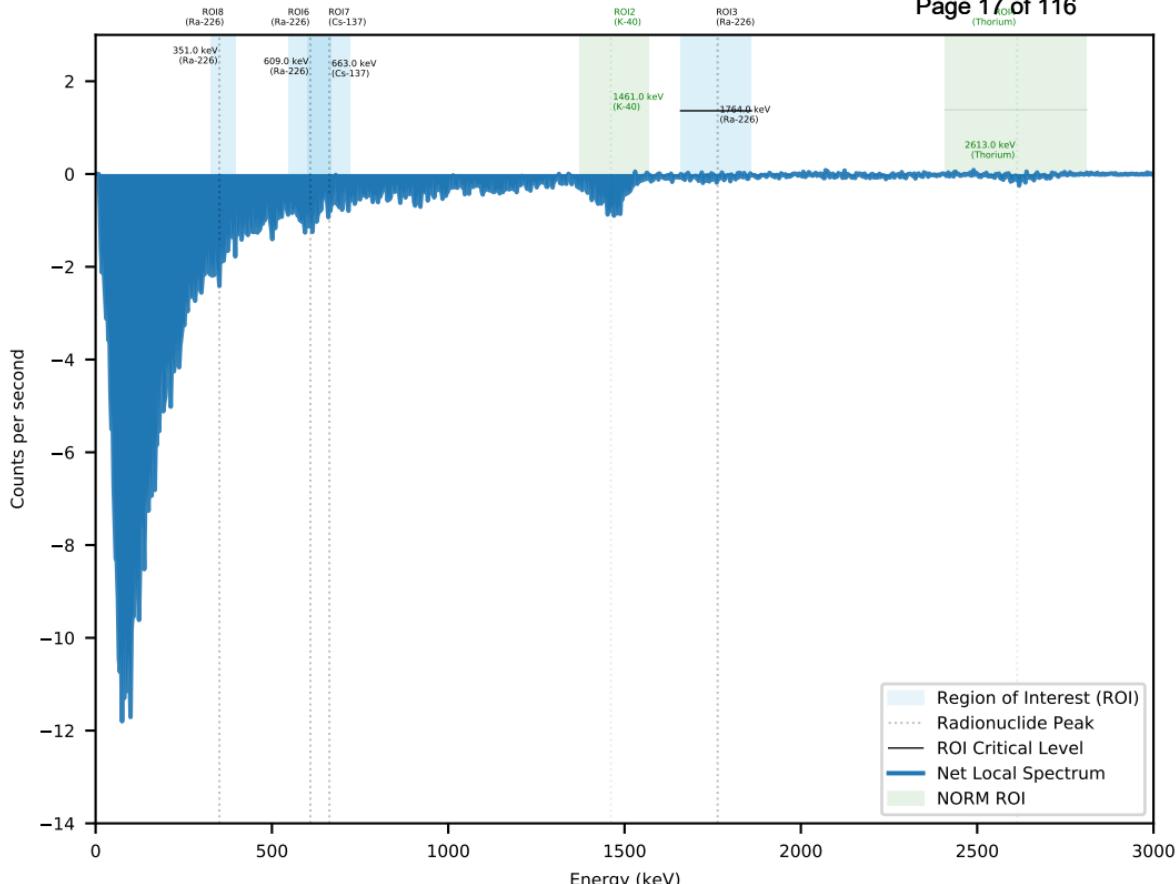
Net Gamma Spectrum, Static Location: 3

Page 16 of 116
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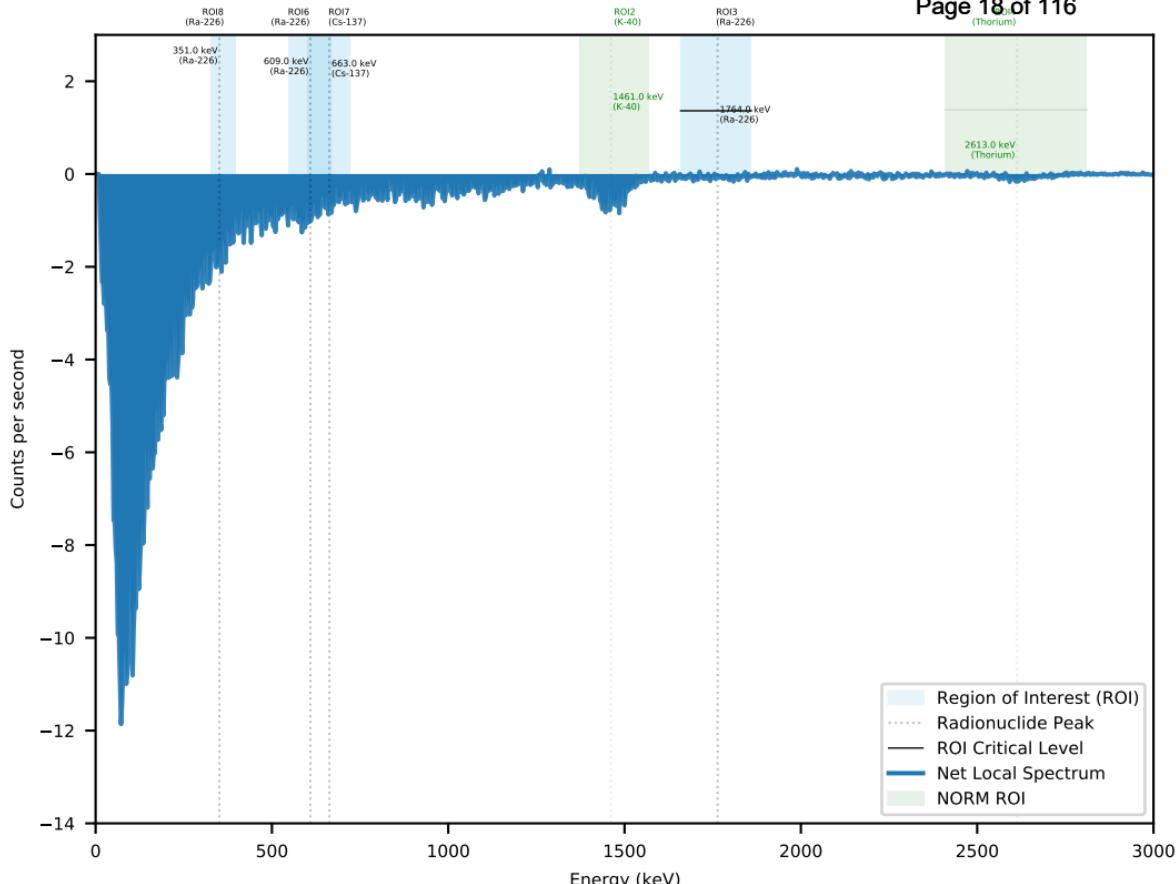
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Page 17 of 116
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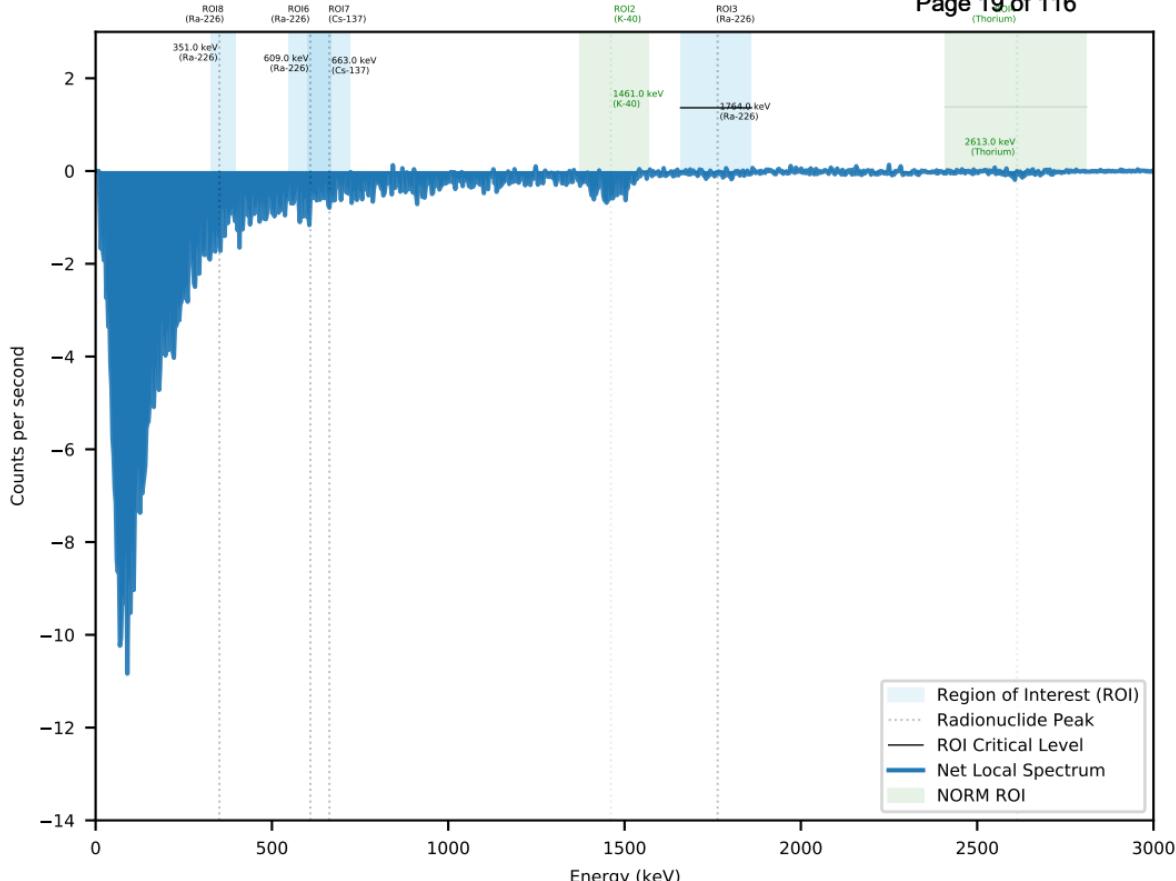
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Page 18 of 116
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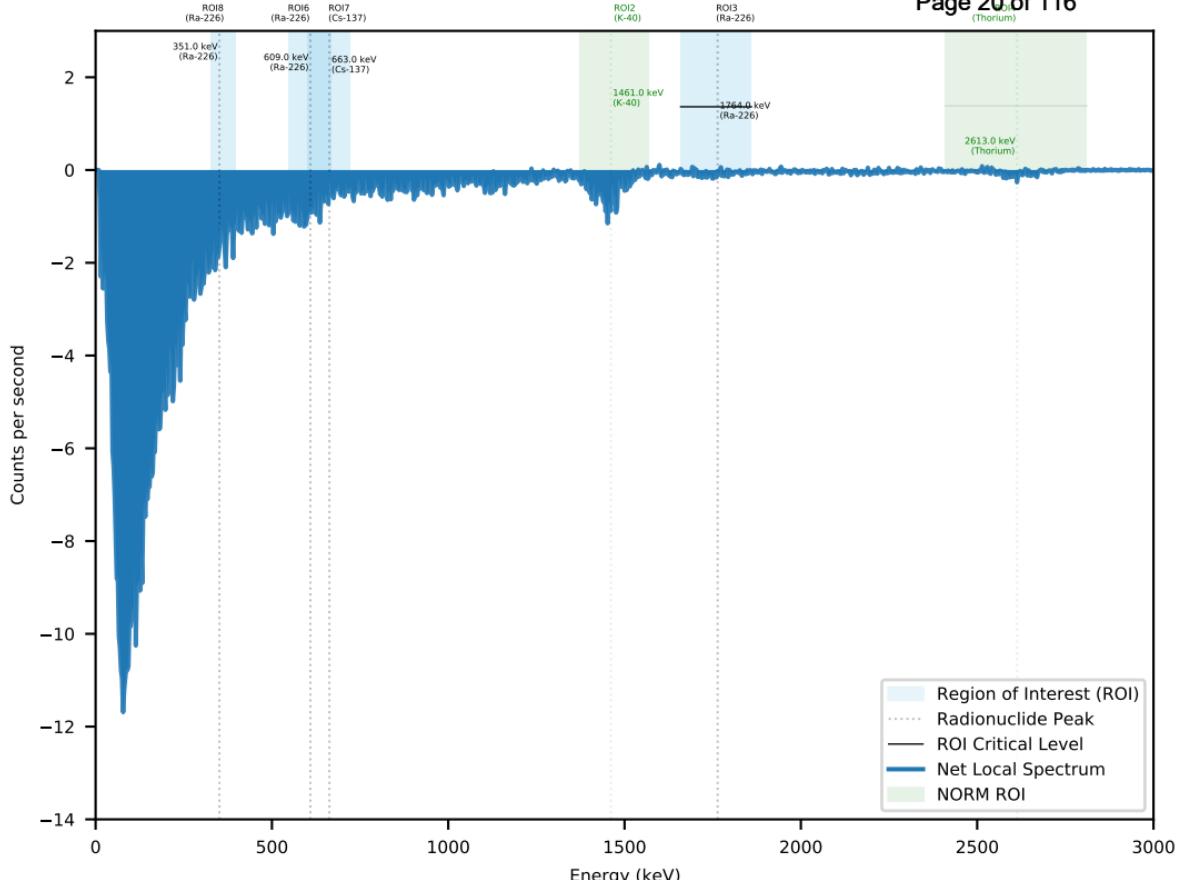
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Page 19 of 116
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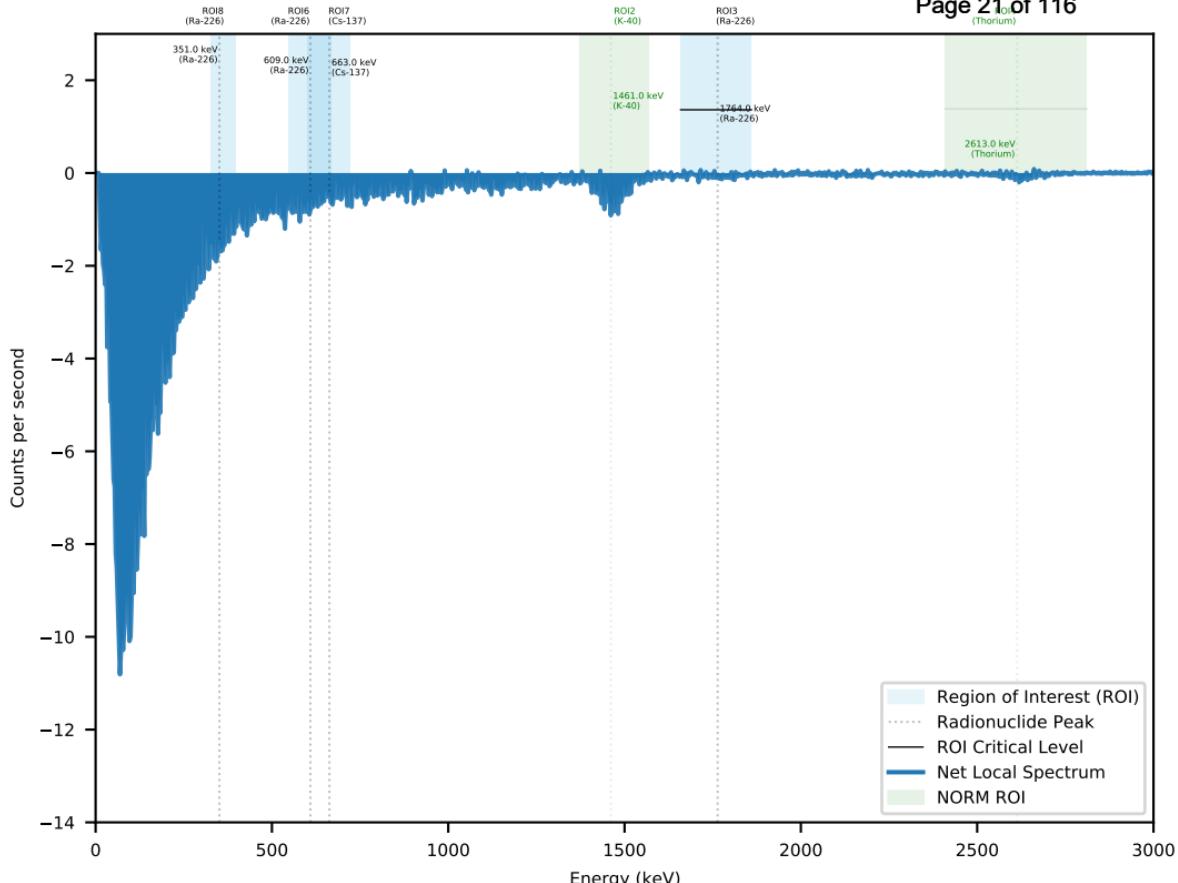
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Page 20 of 116
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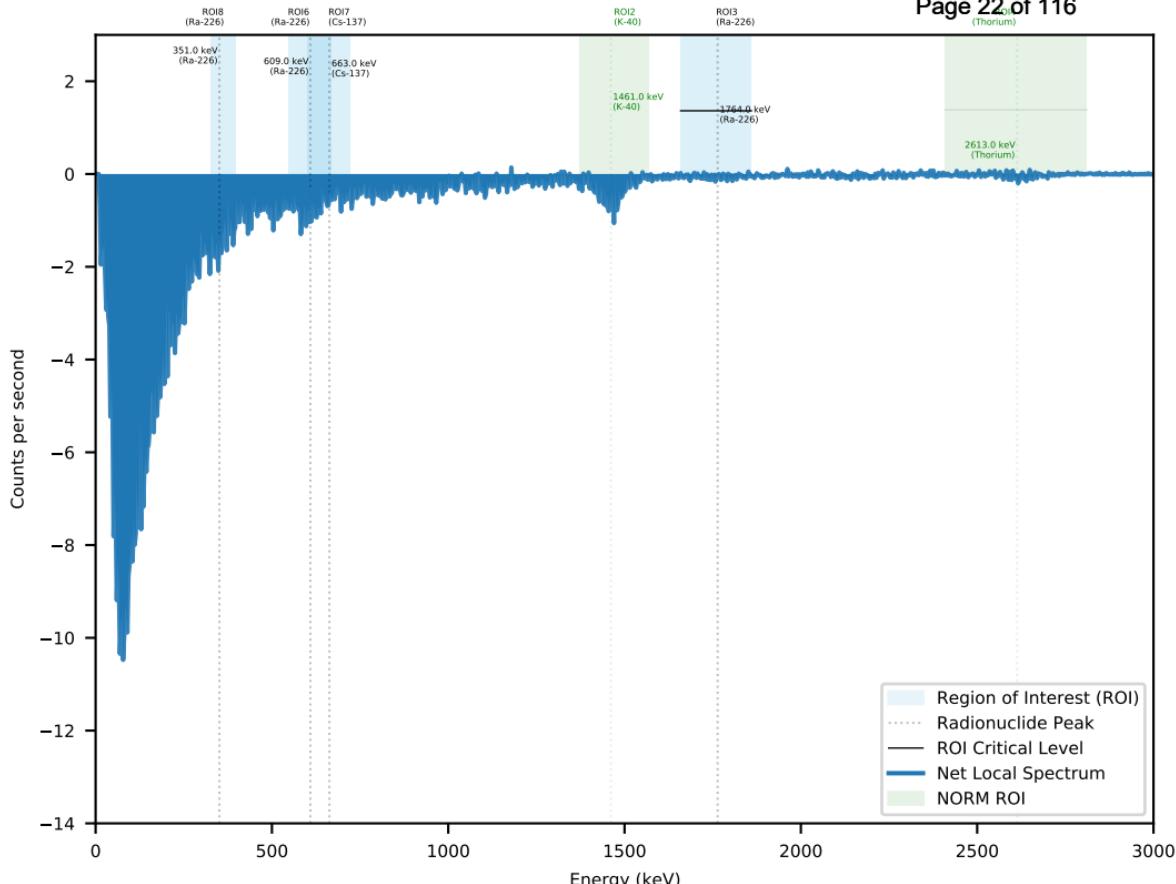
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Page 21 of 116
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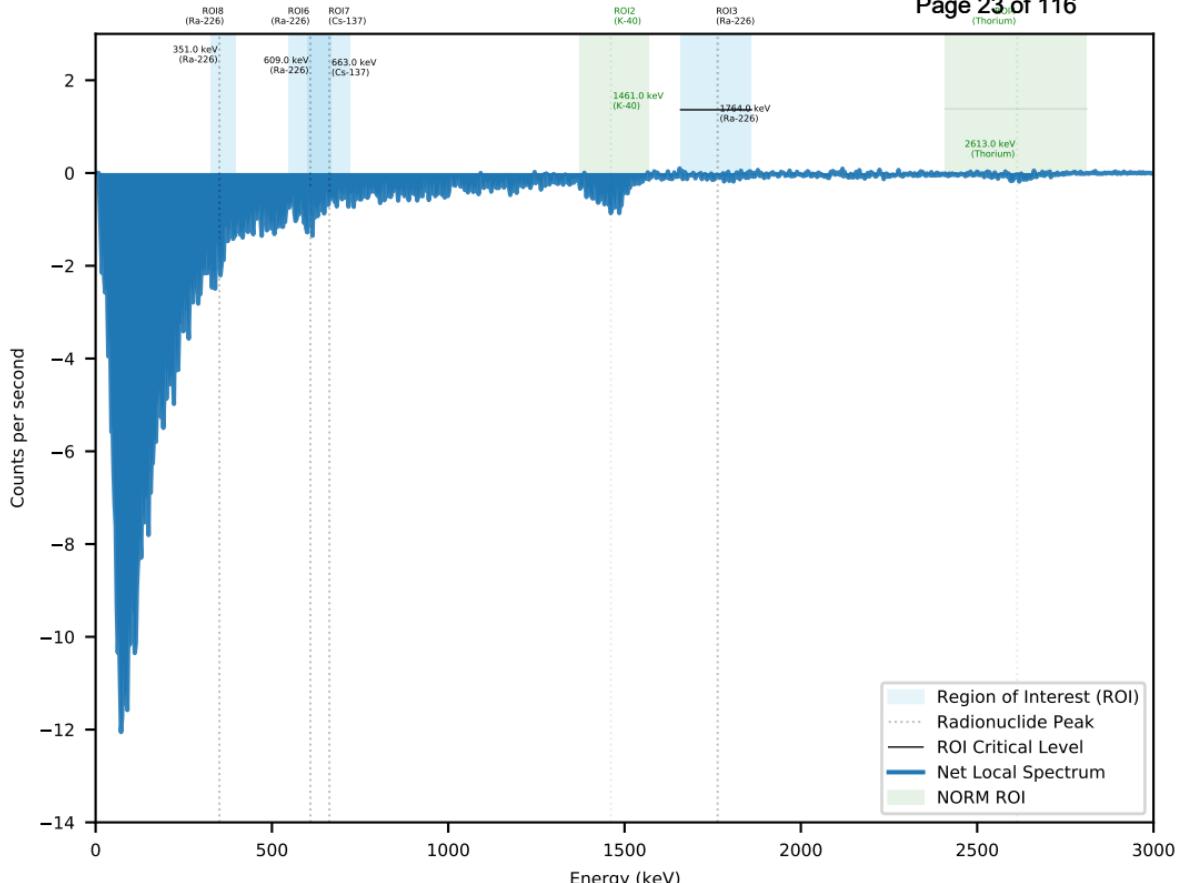
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Page 22 of 116
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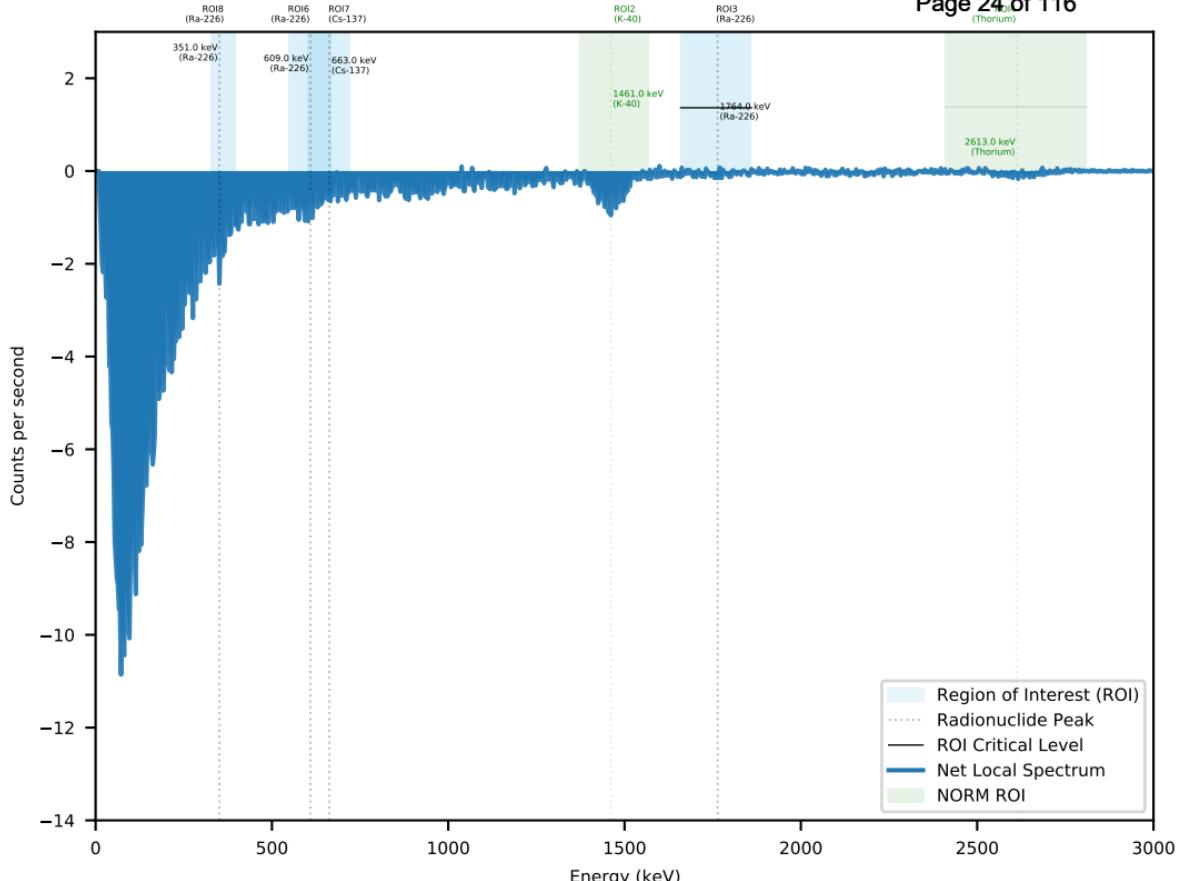
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Page 23 of 116
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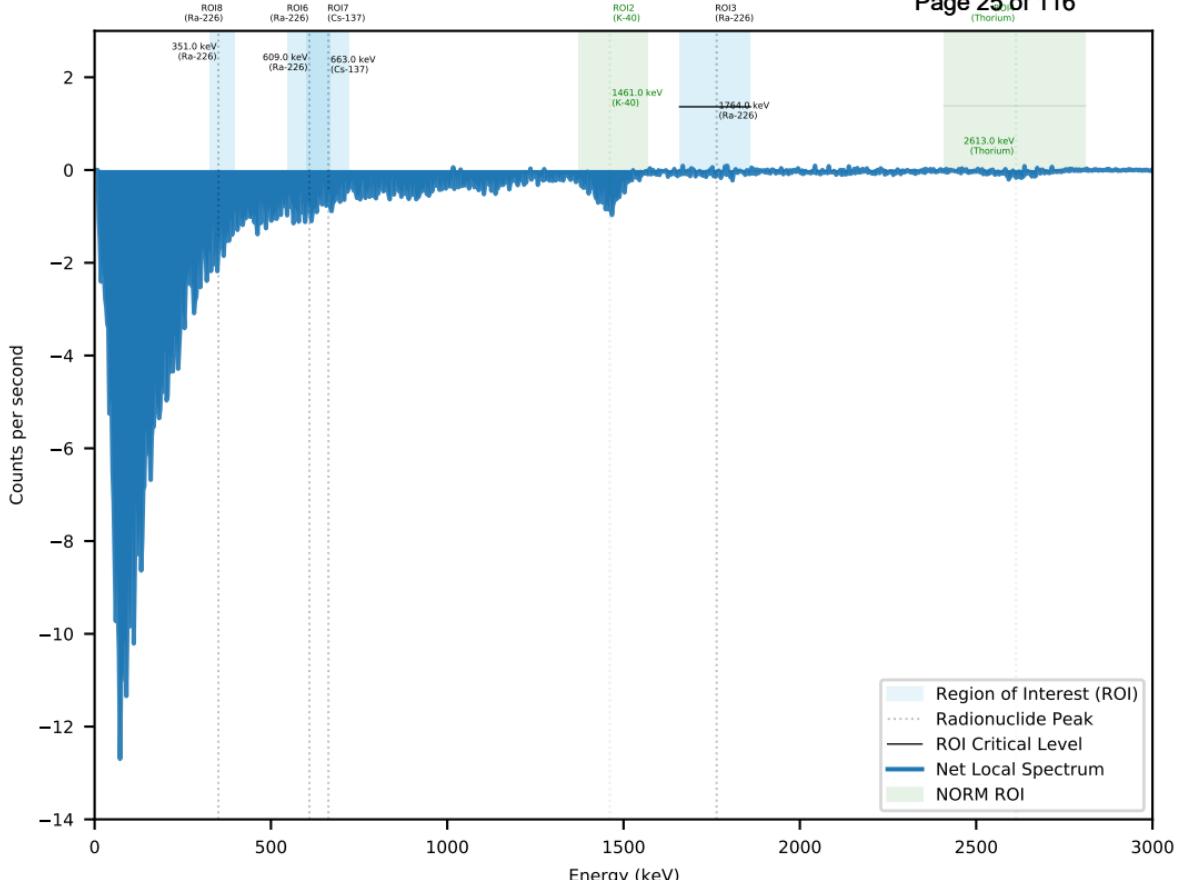
Net Gamma Spectrum, Static Location: 11

Page 24 of 116
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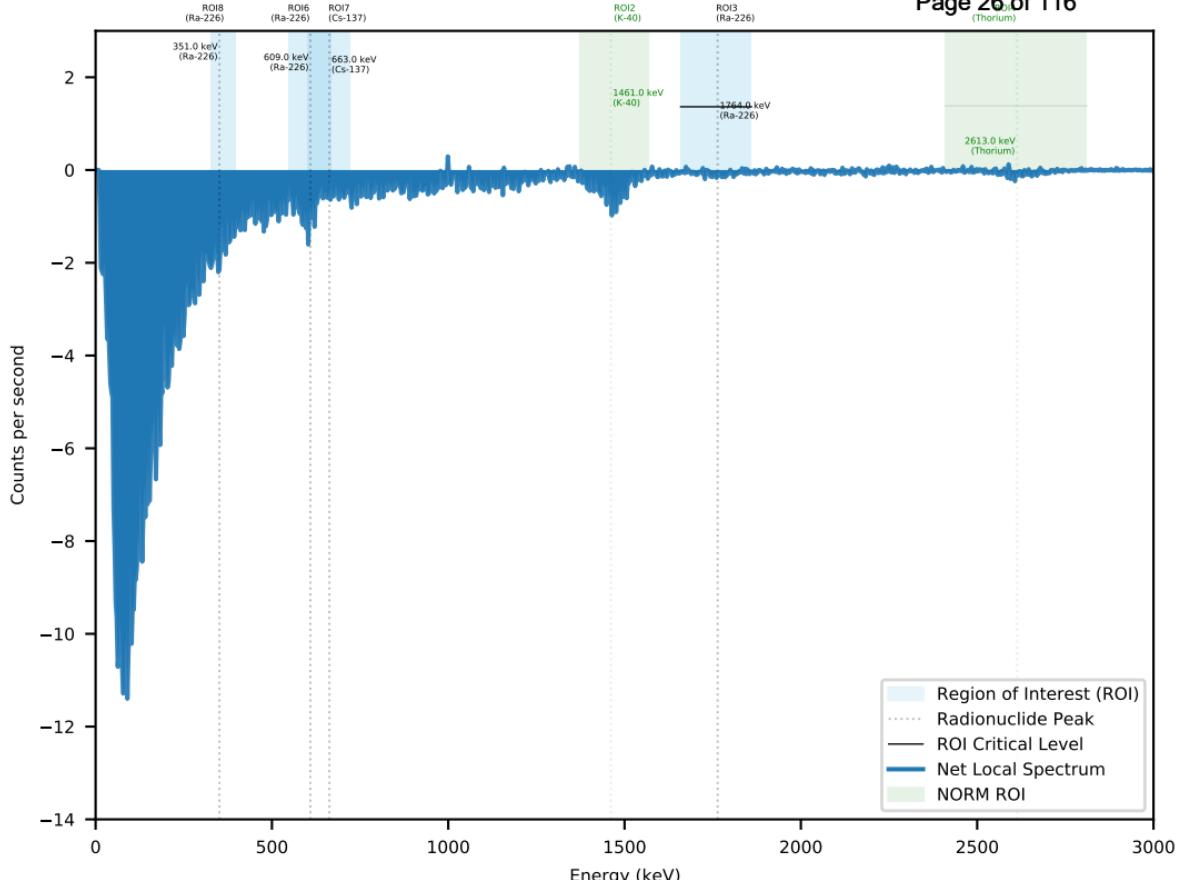
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Page 25 of 116
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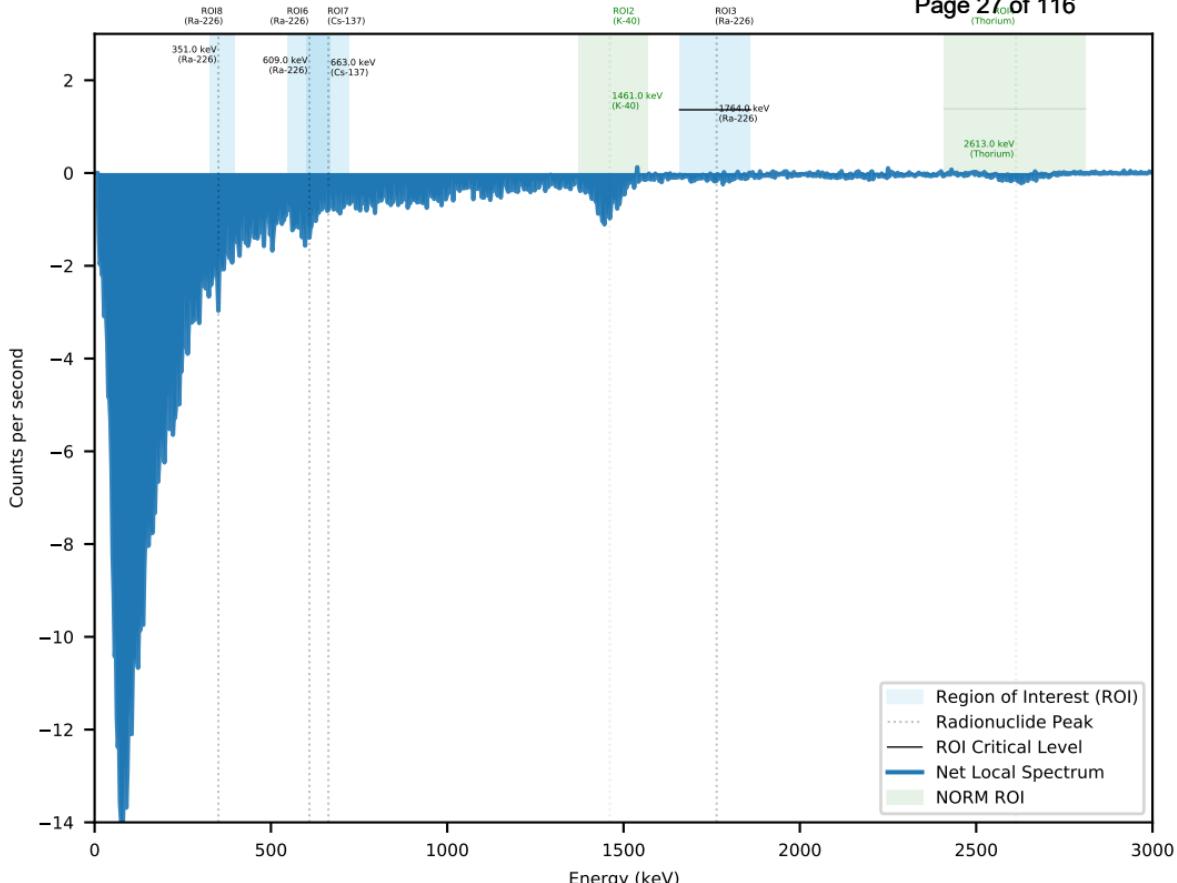
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Page 26 of 116
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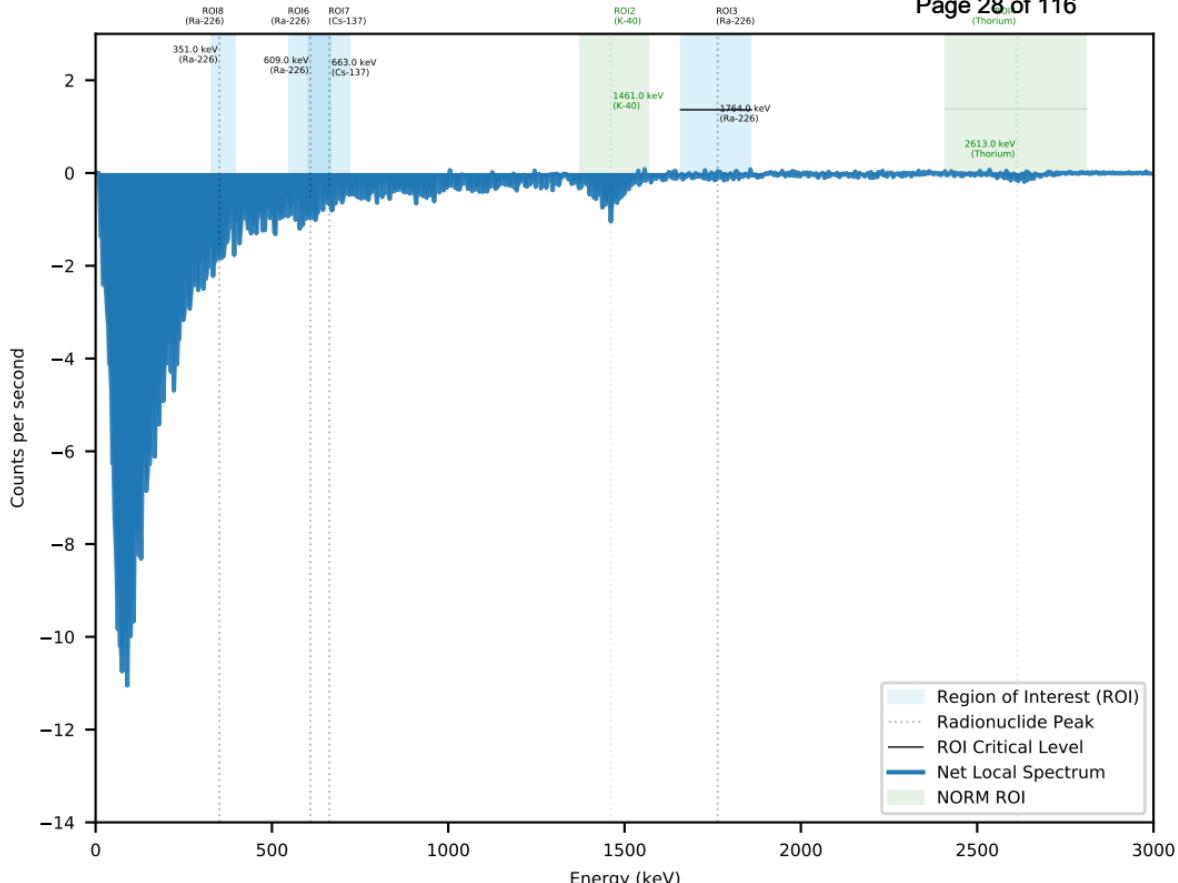
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Page 27 of 116



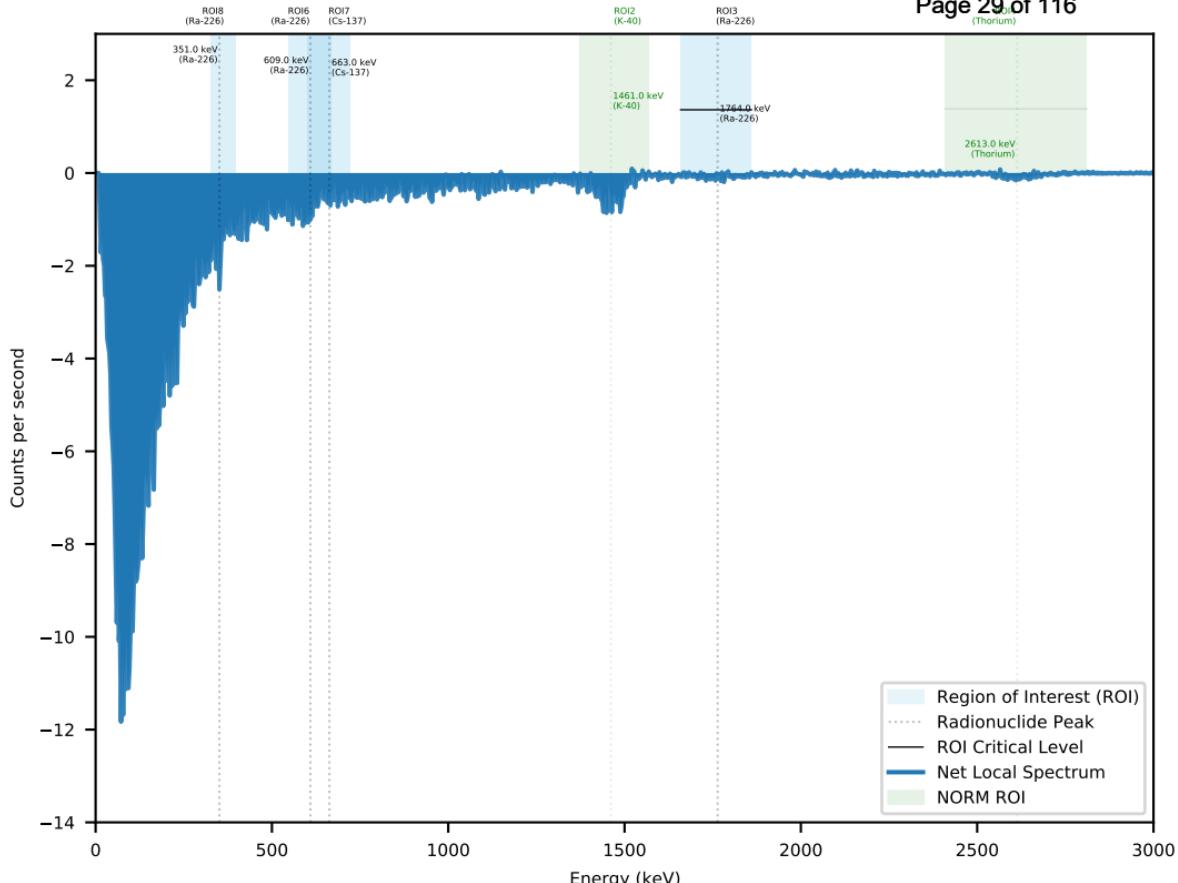
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Page 28 of 116
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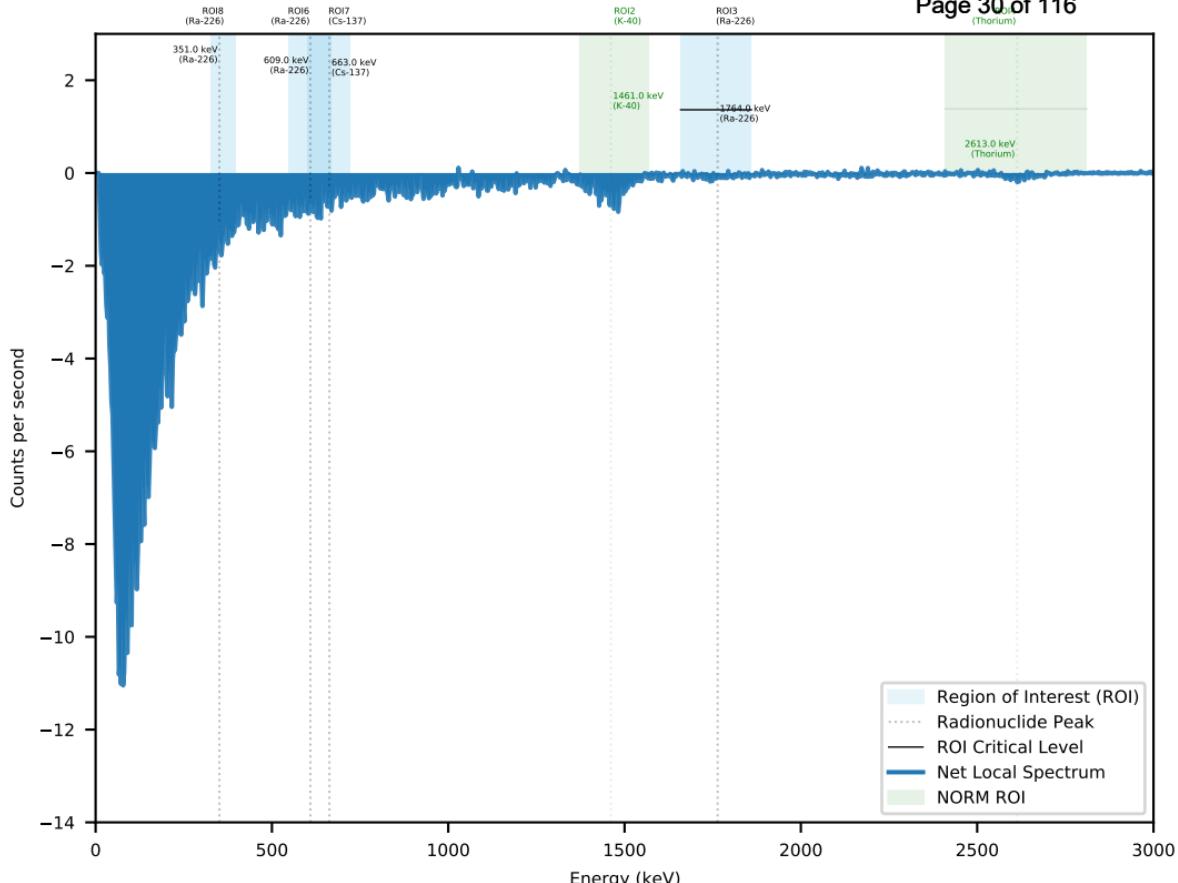
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Page 29 of 116
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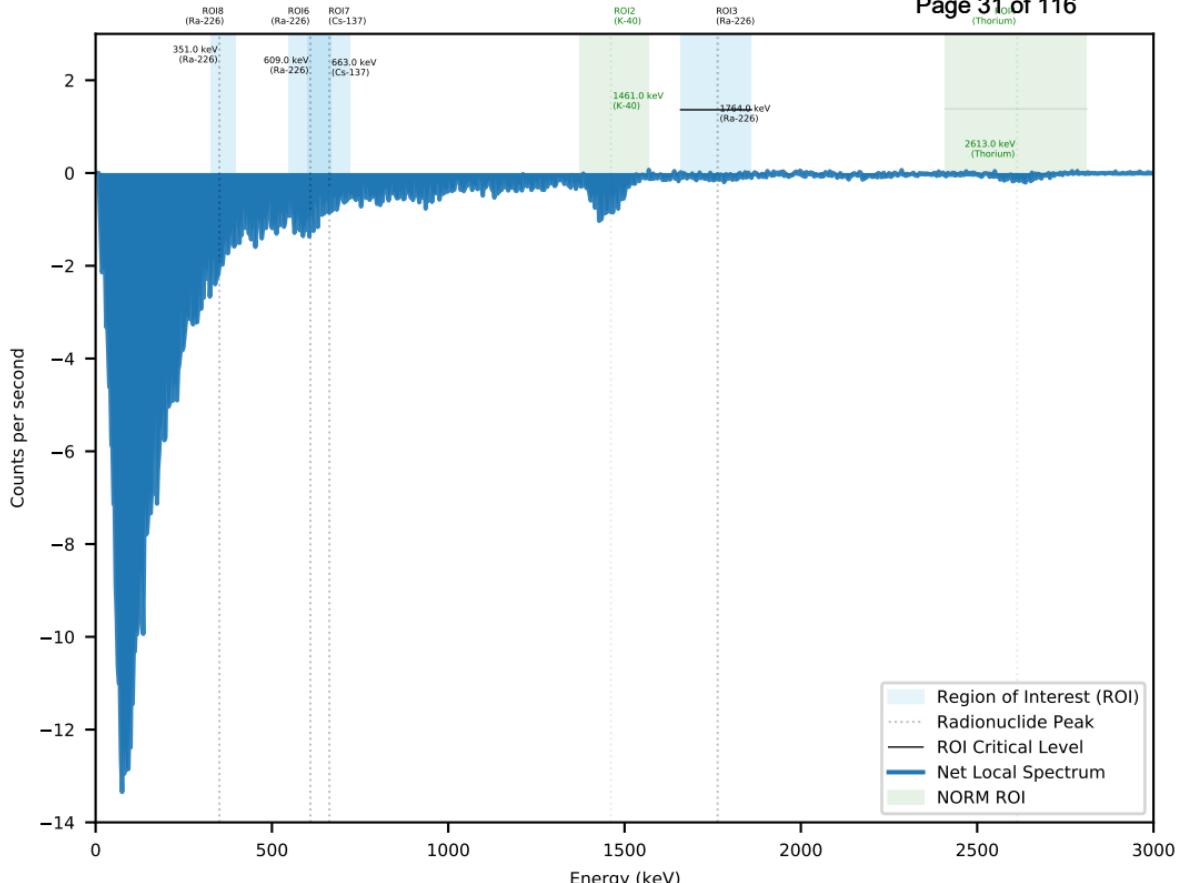
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Page 30 of 116
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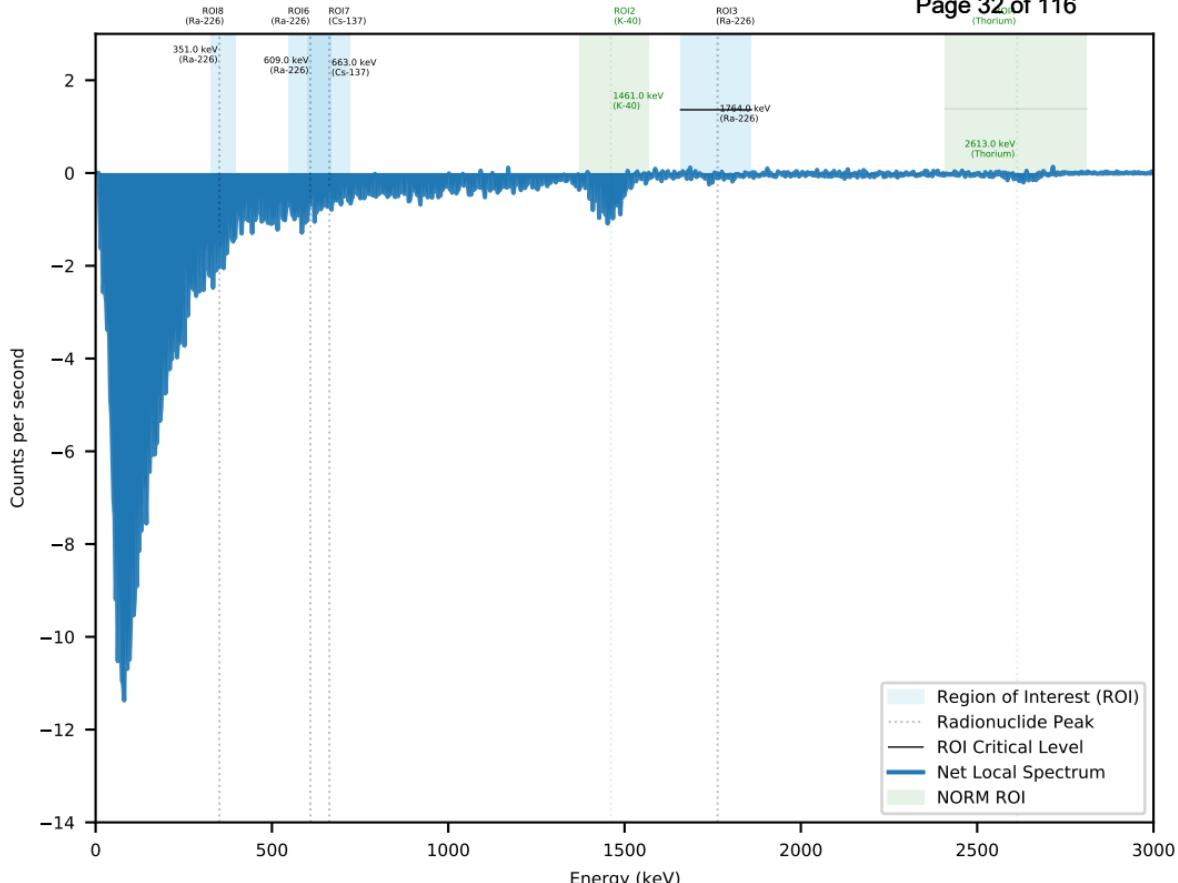
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Page 31 of 116
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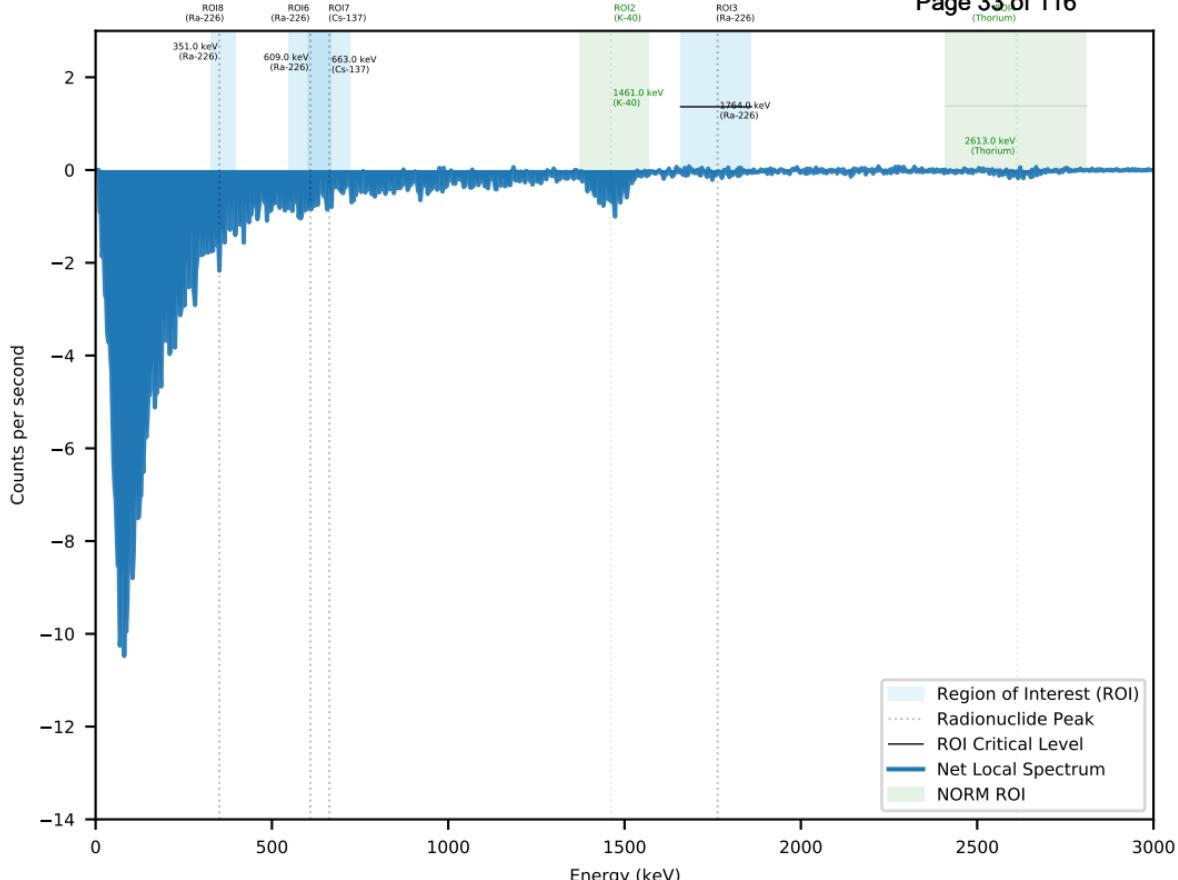
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Page 32 of 116
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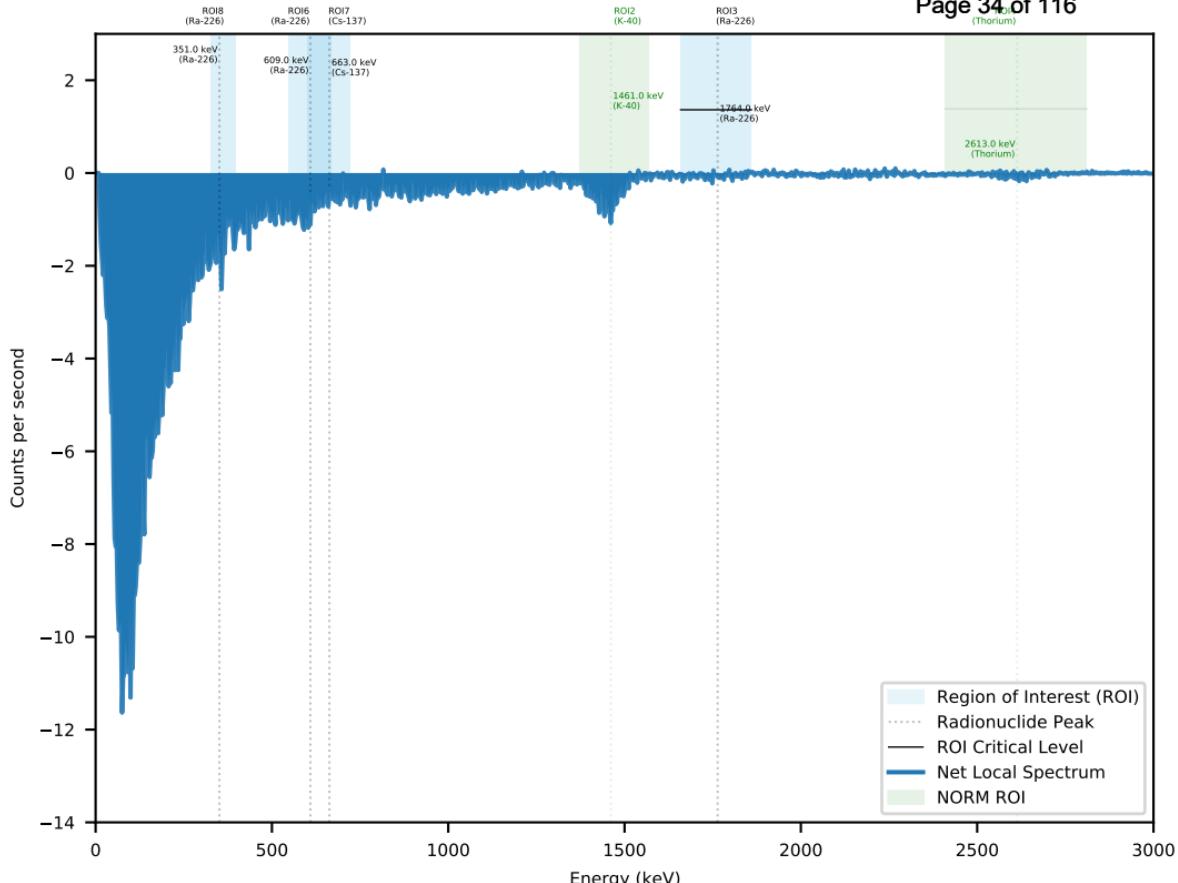
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Page 33 of 116
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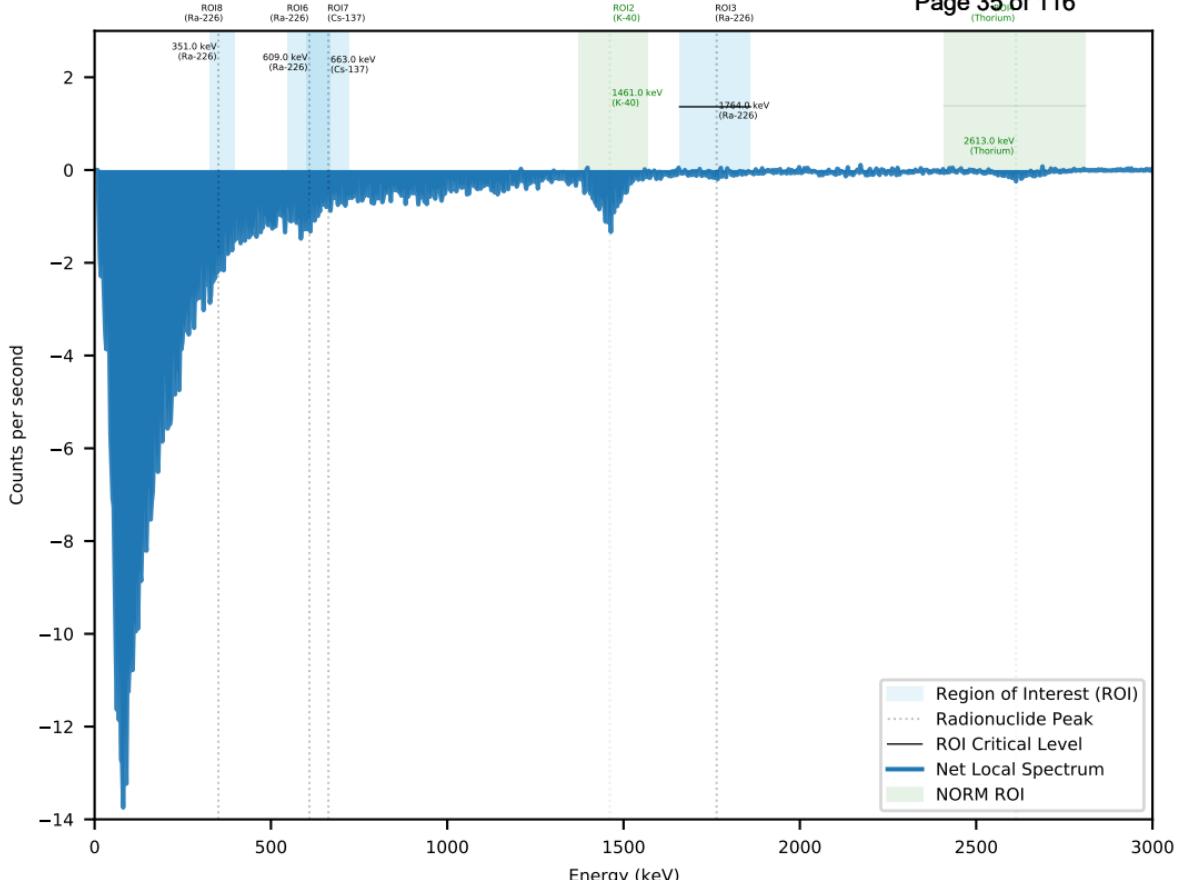
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Page 34 of 116
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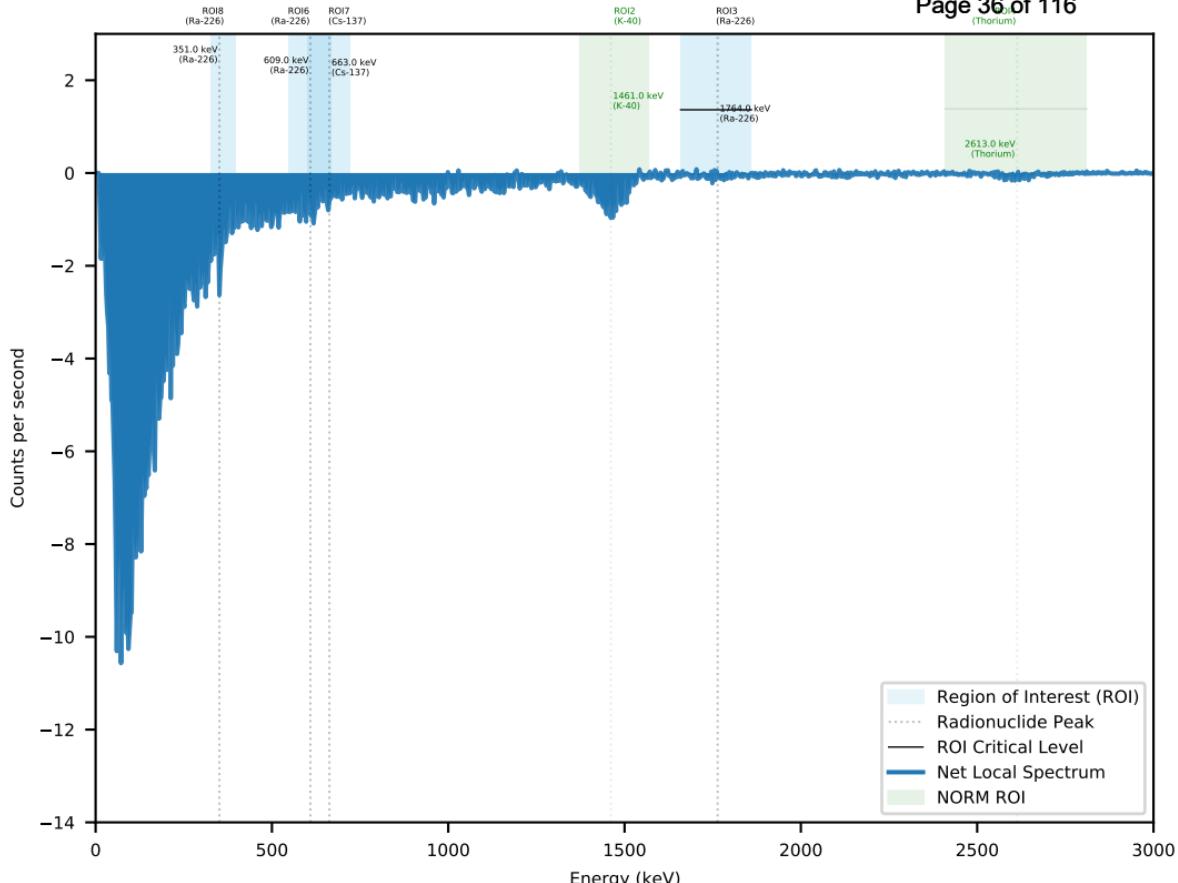
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Page 35 of 116
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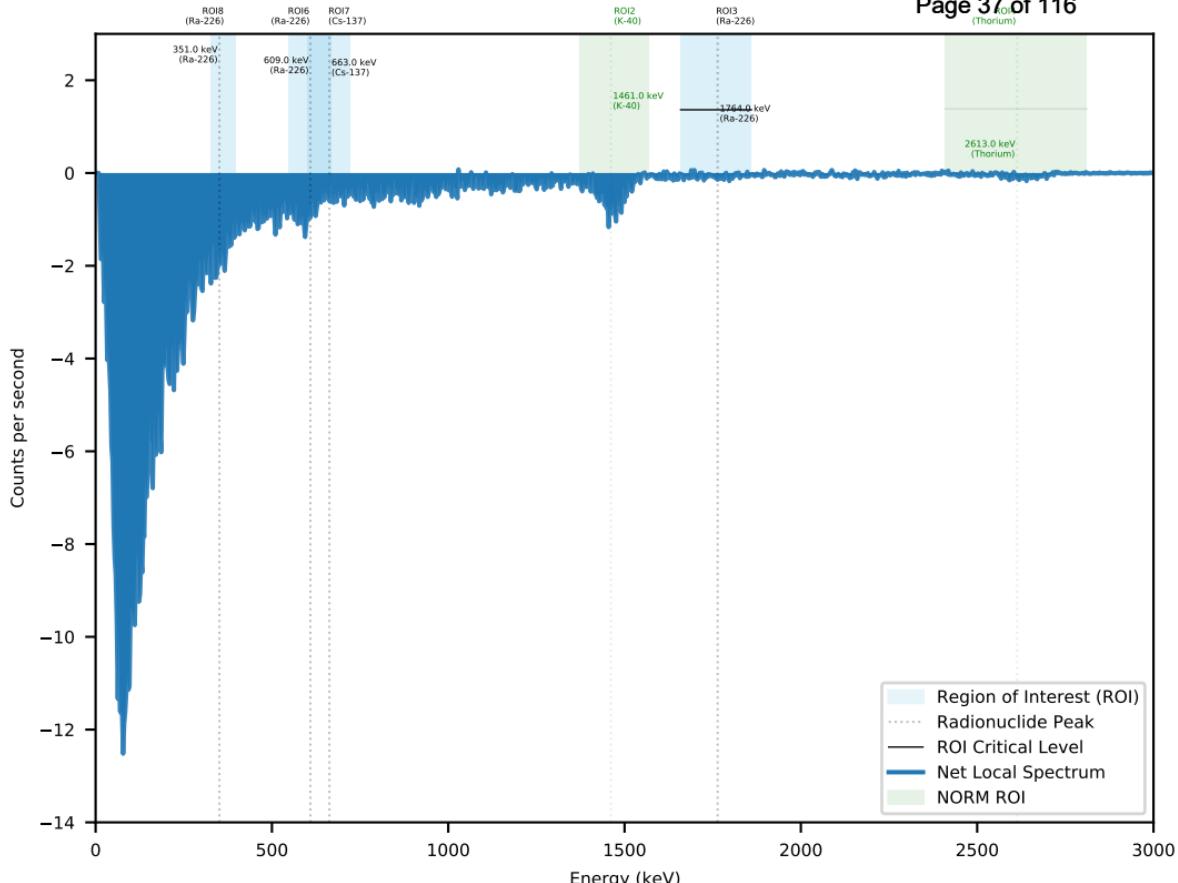
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Page 36 of 116
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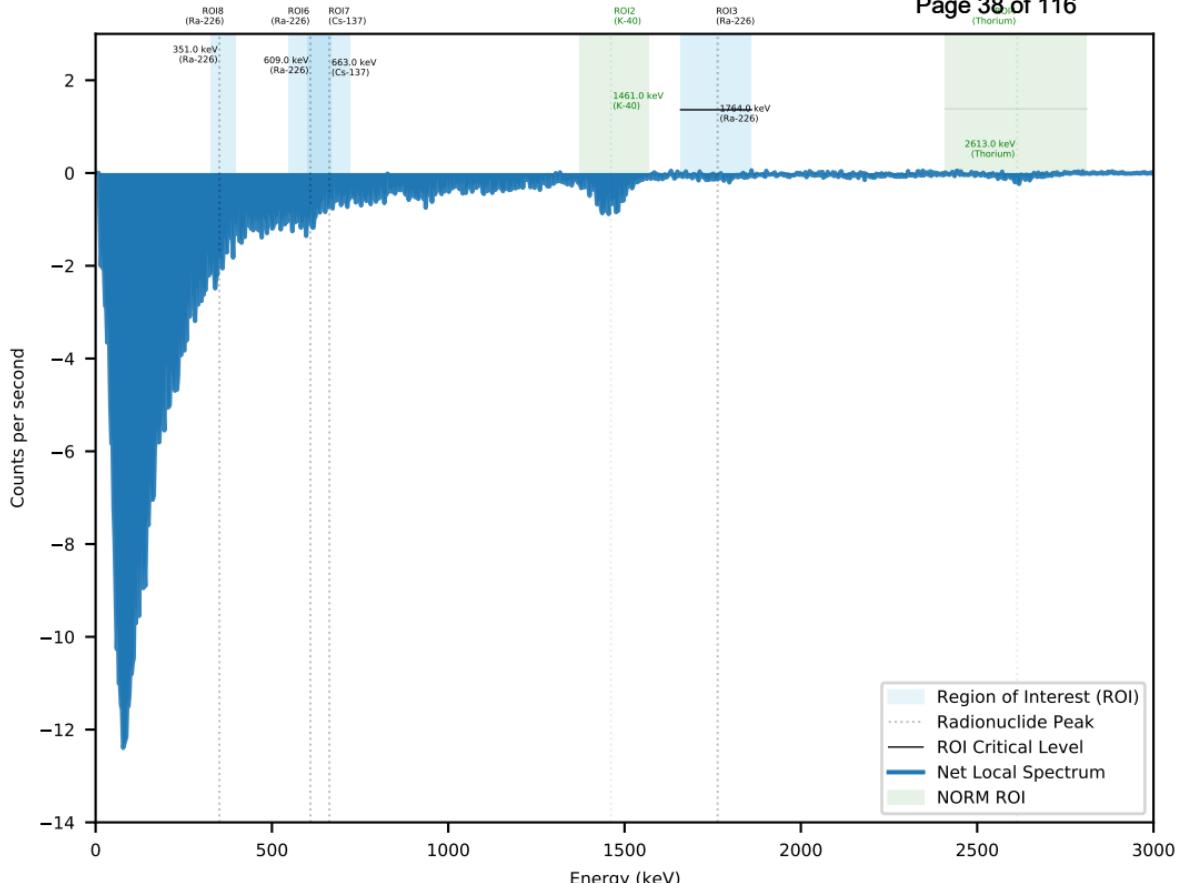
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Page 37 of 116
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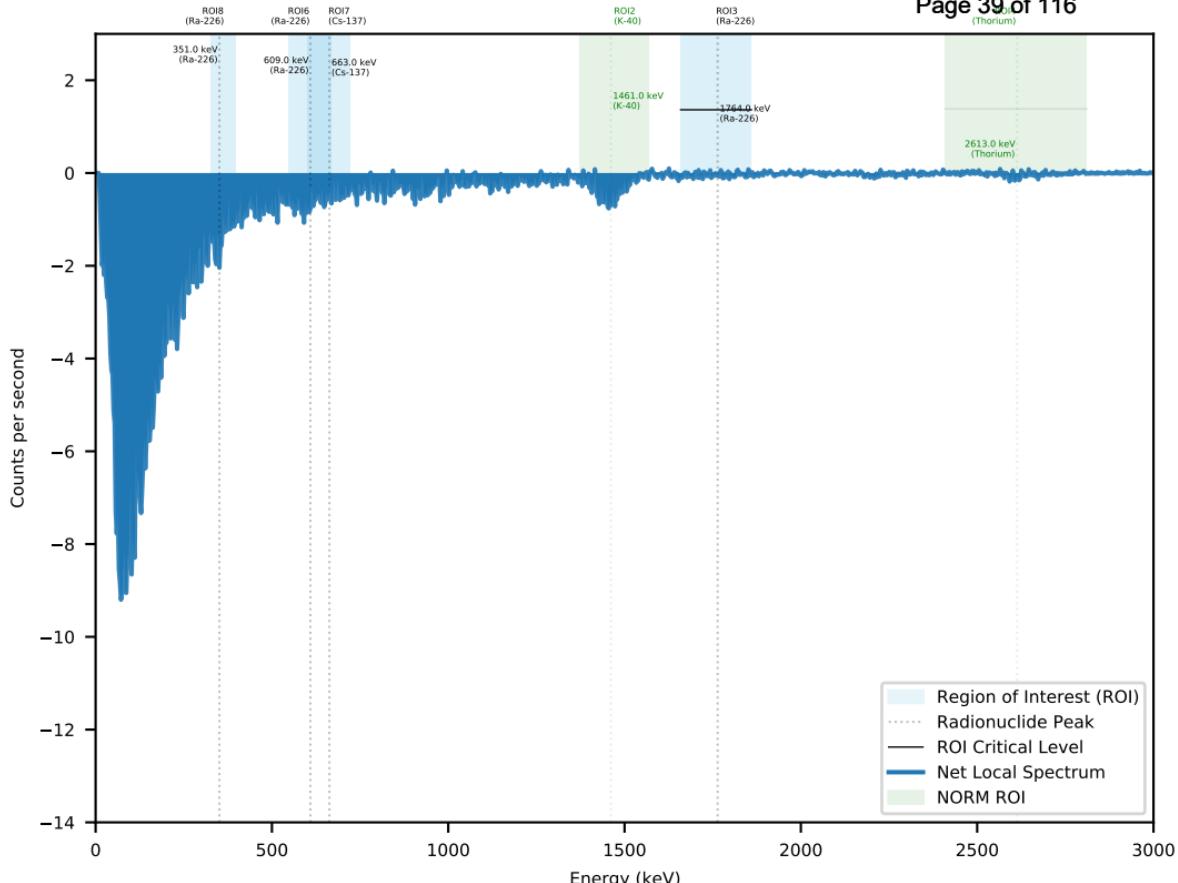
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Page 38 of 116
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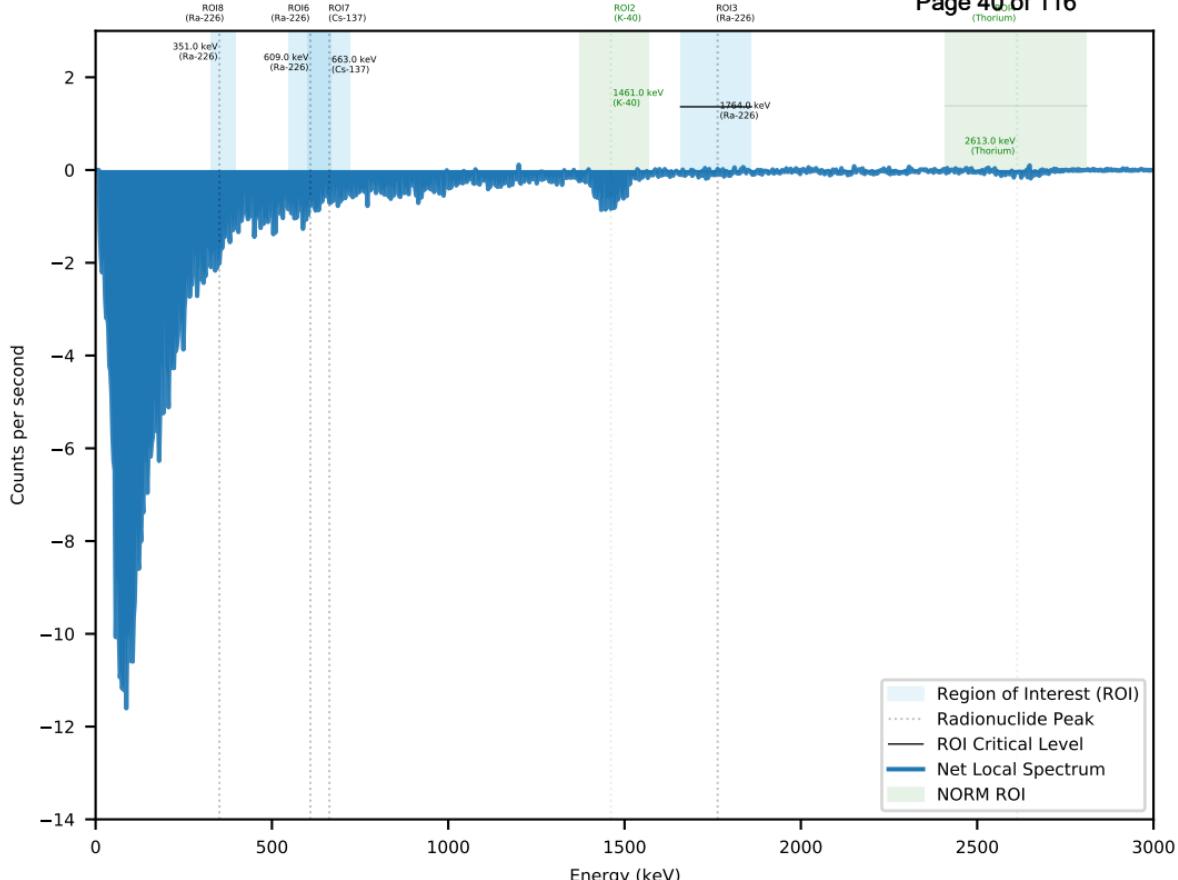
Net Gamma Spectrum, Static Location: 26

Page 39 of 116
 (Thorium)



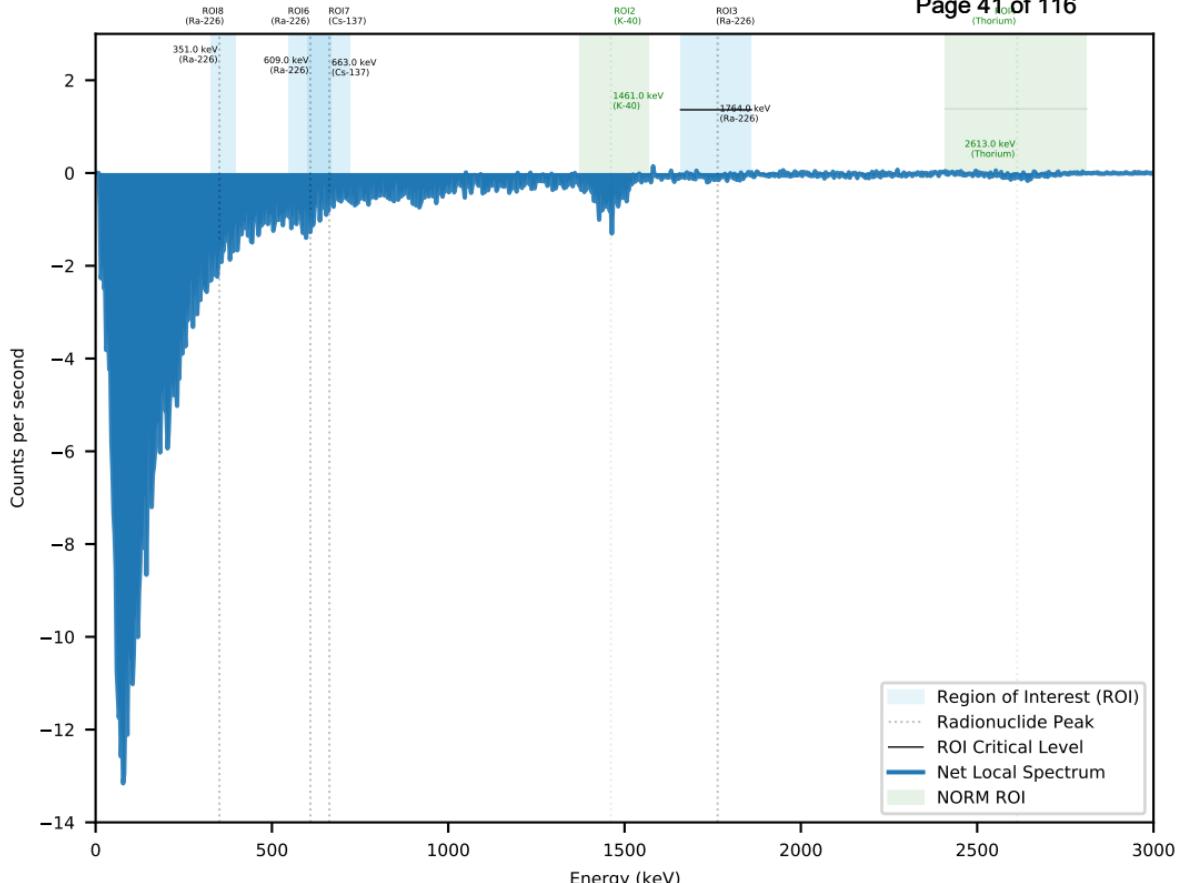
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Page 40 of 116
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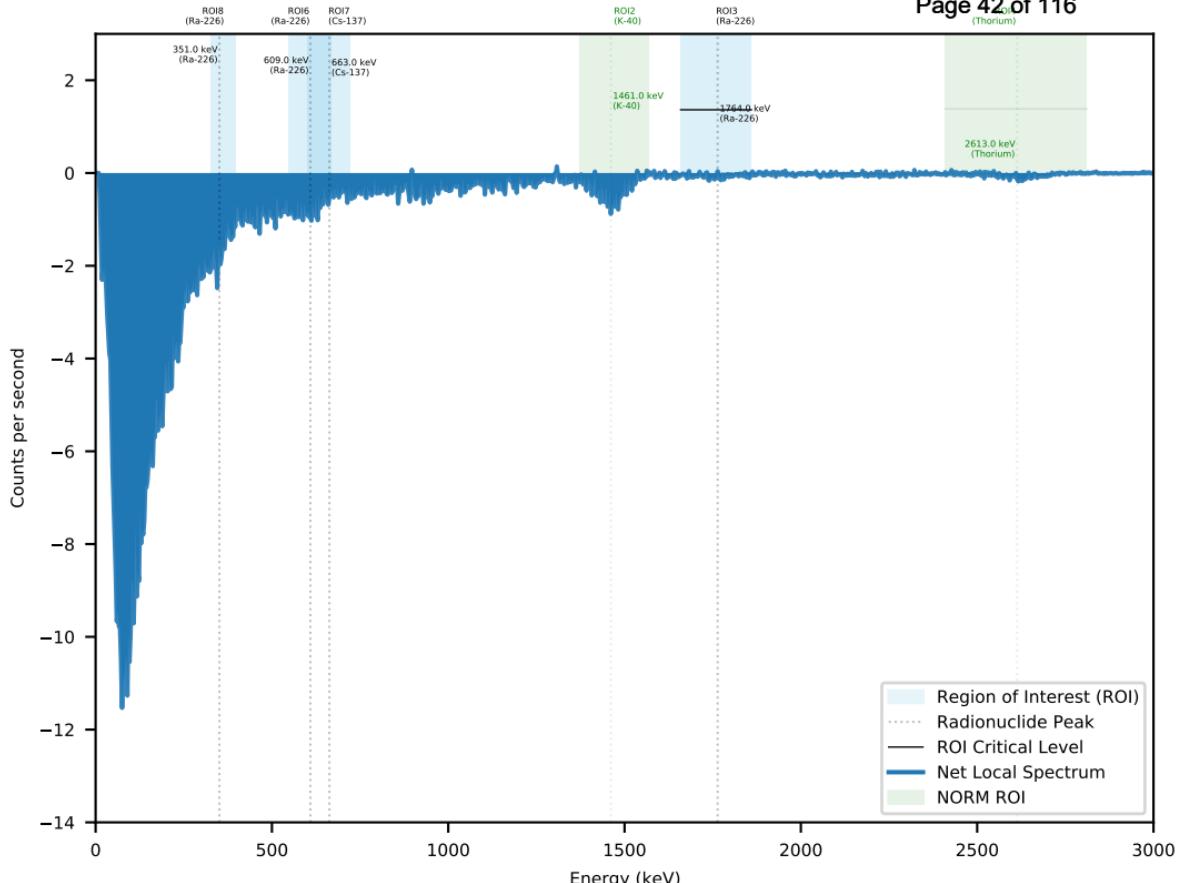
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Page 41 of 116
 (Thorium)



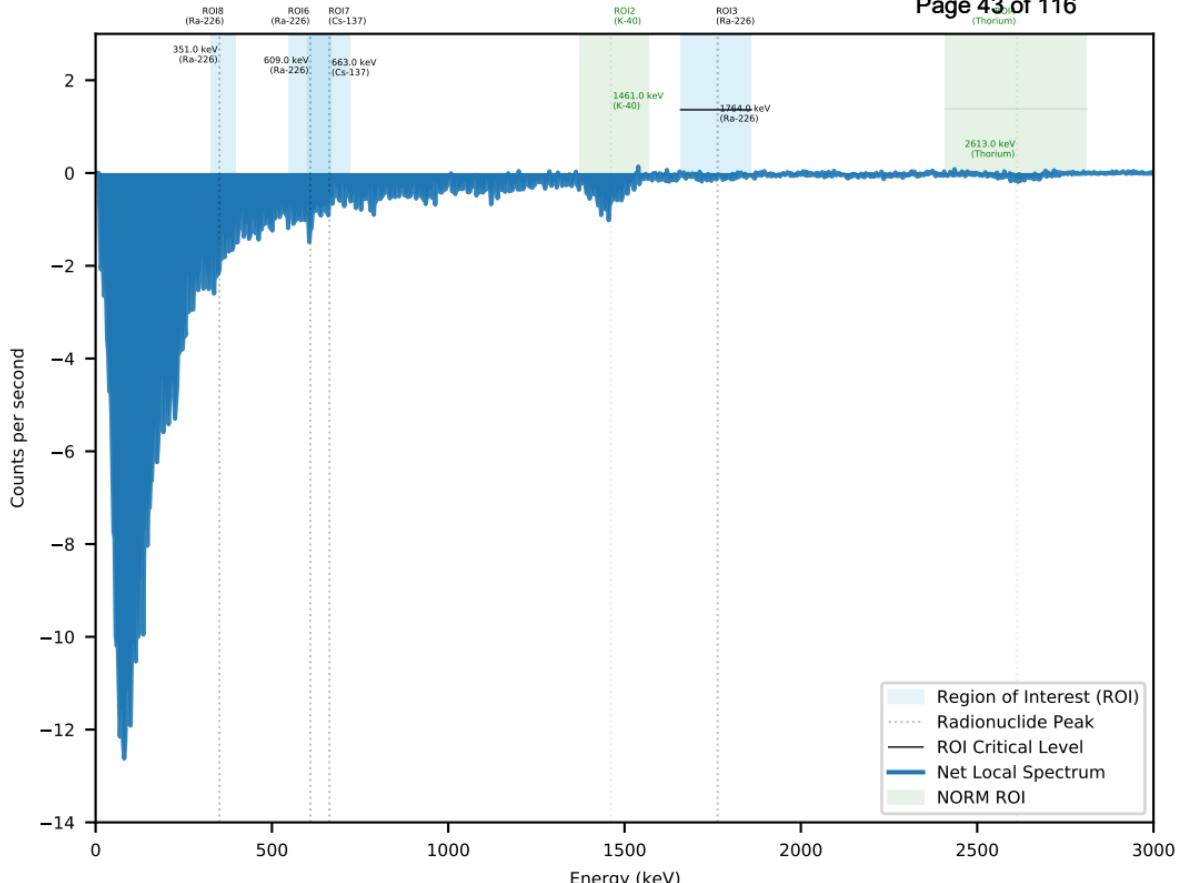
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Page 42 of 116
 (Thorium)



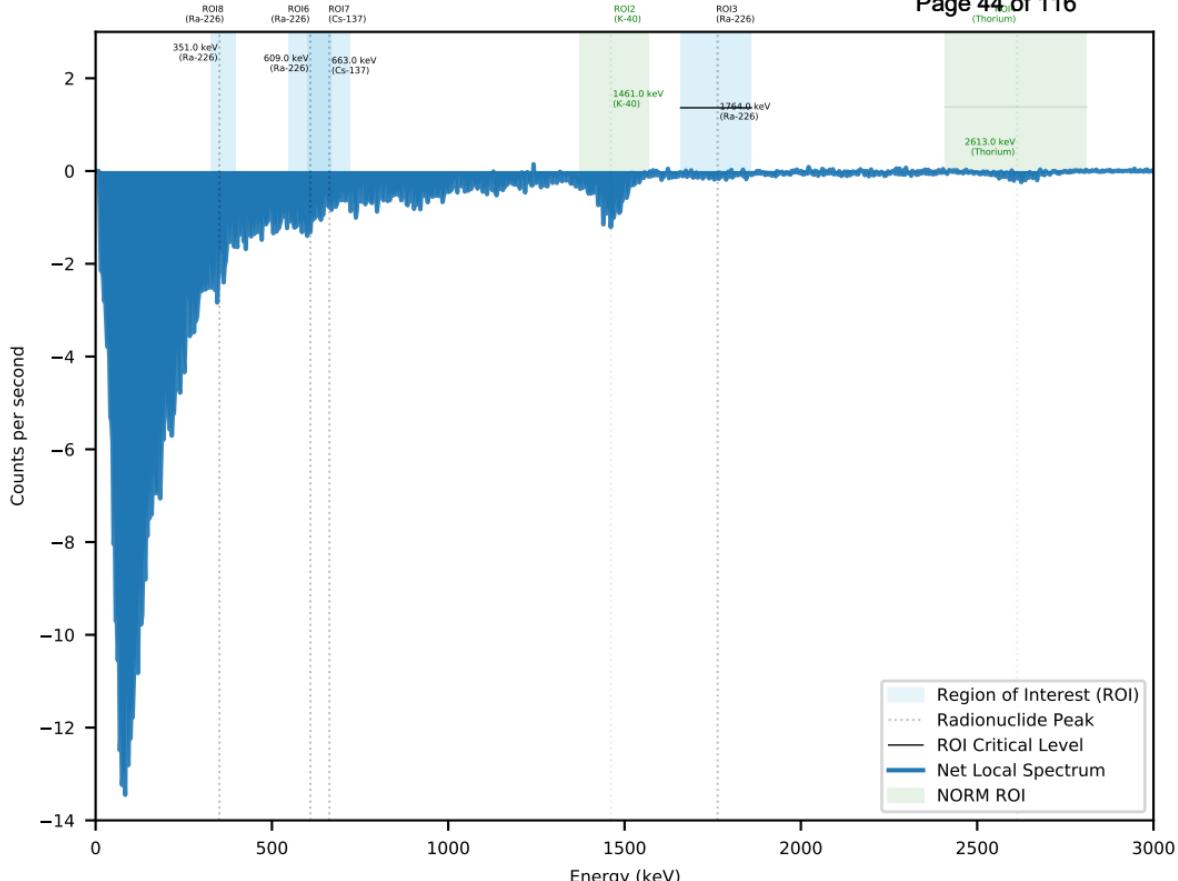
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Page 43 of 116
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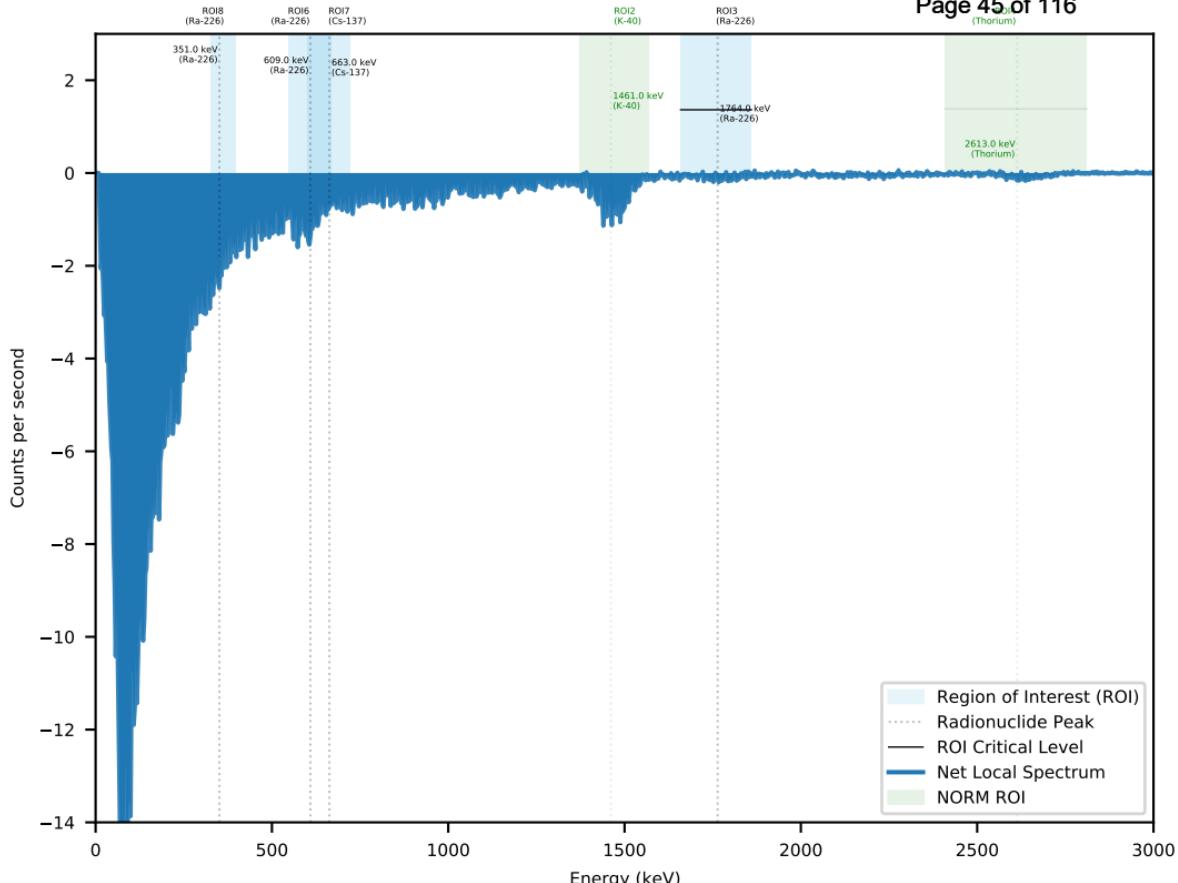
Net Gamma Spectrum, Static Location: 31

Page 44 of 116



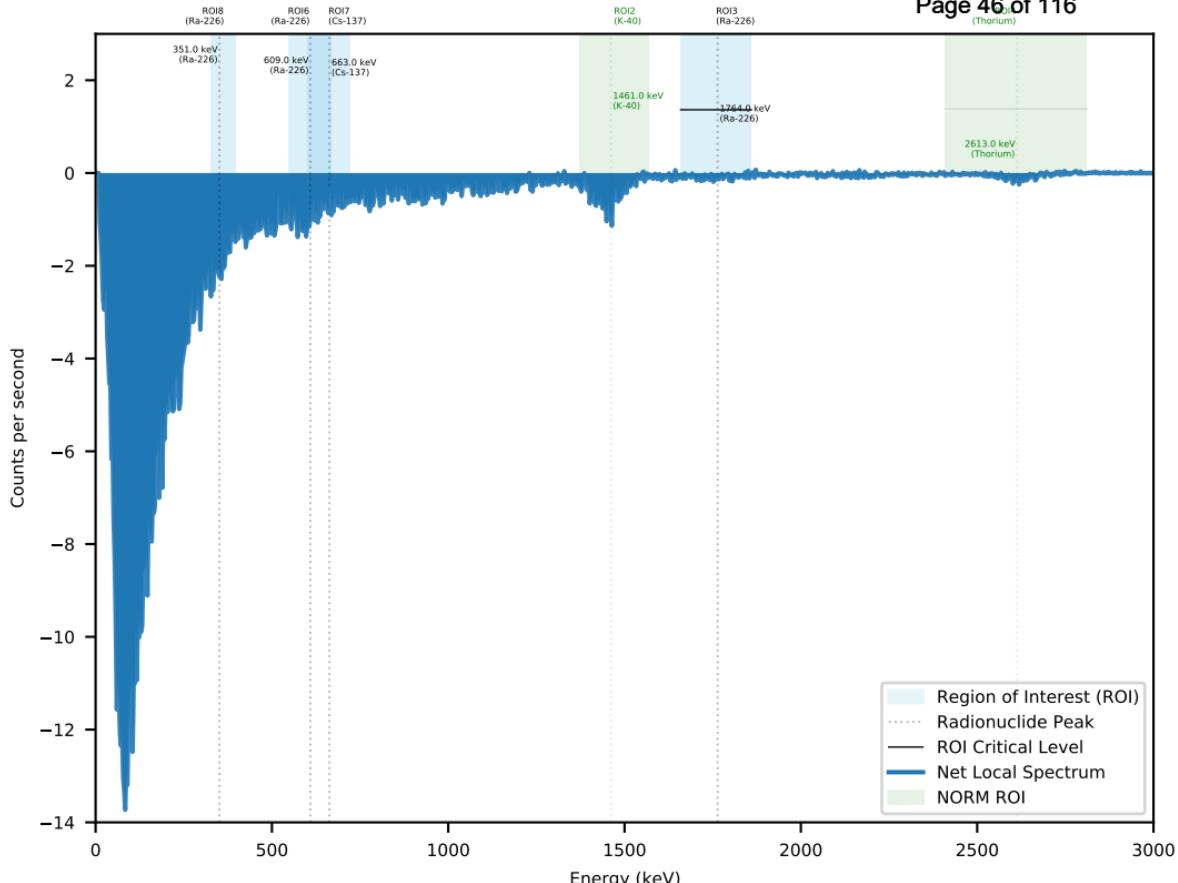
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Page 45 of 116
 {Thorium}



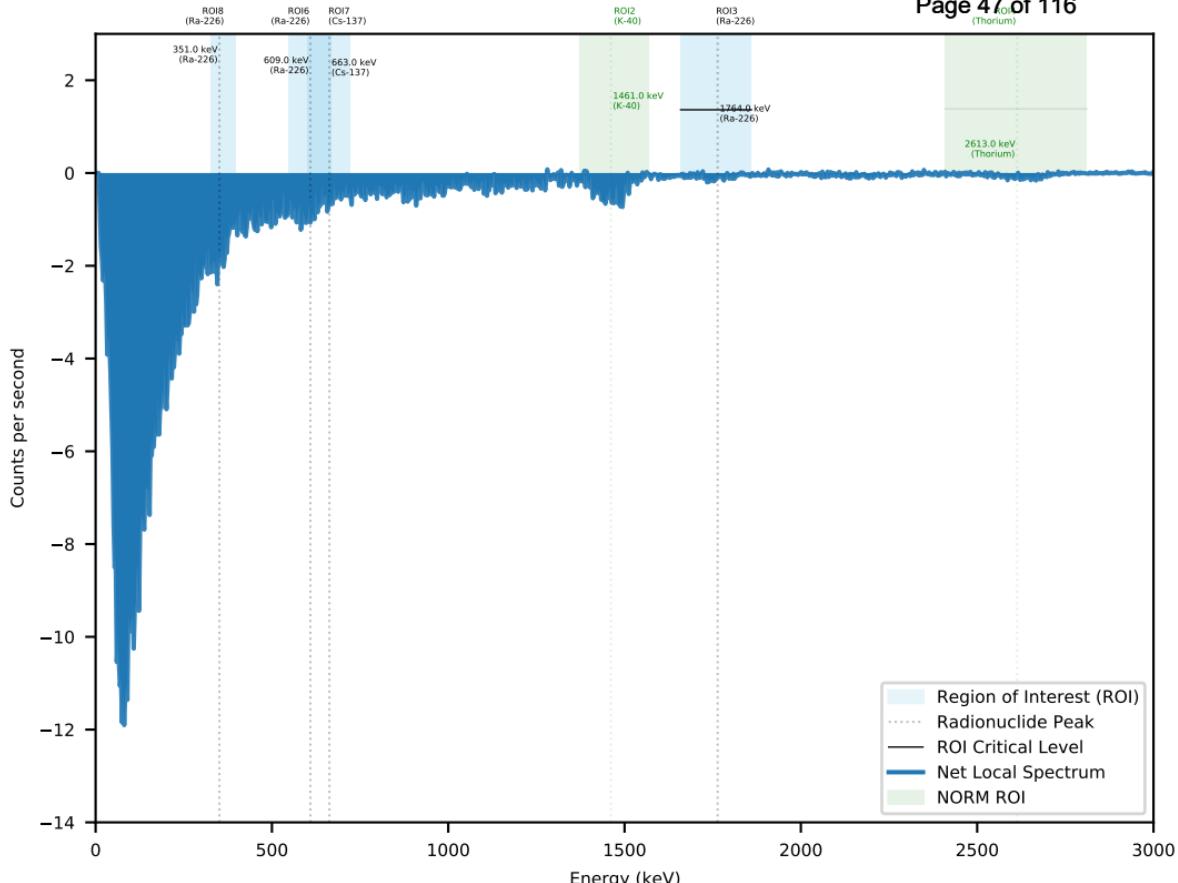
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Page 46 of 116
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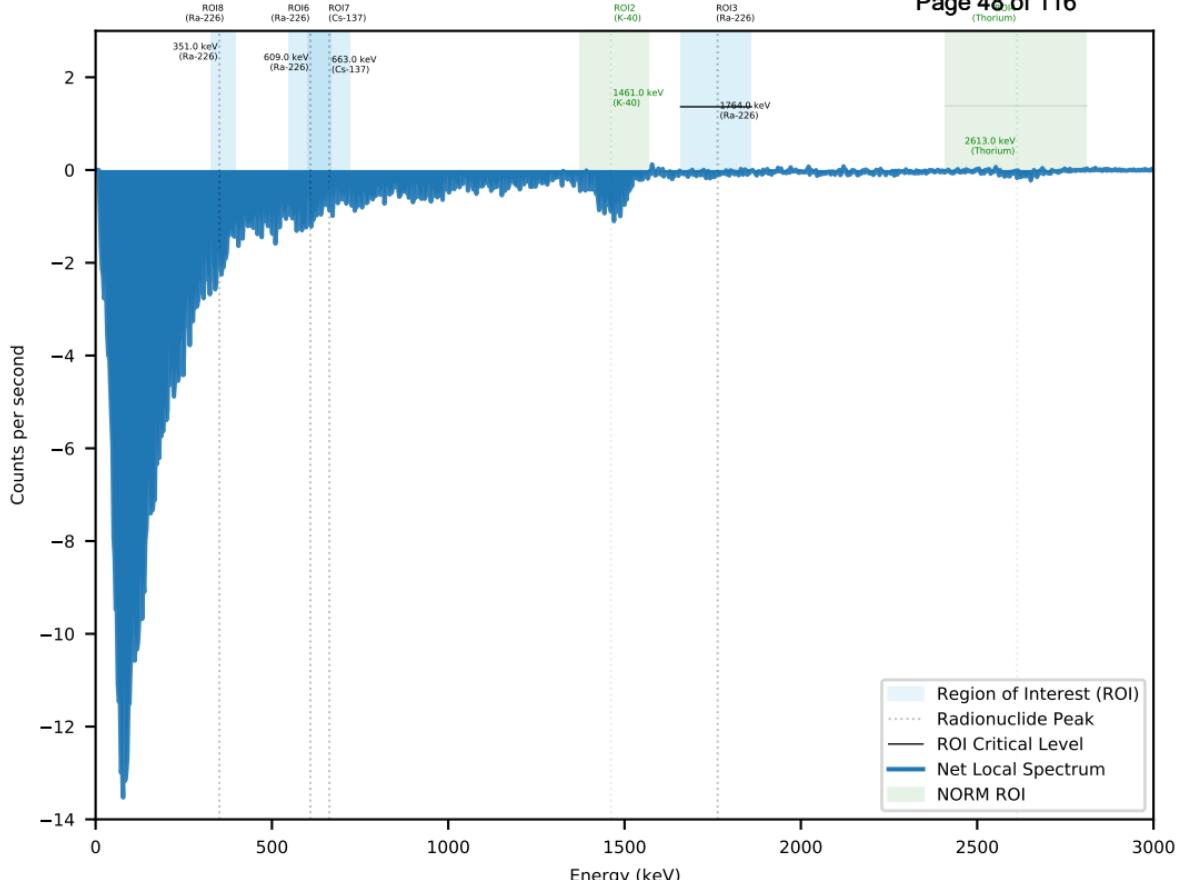
Net Gamma Spectrum, Static Location: 34

Page 47 of 116



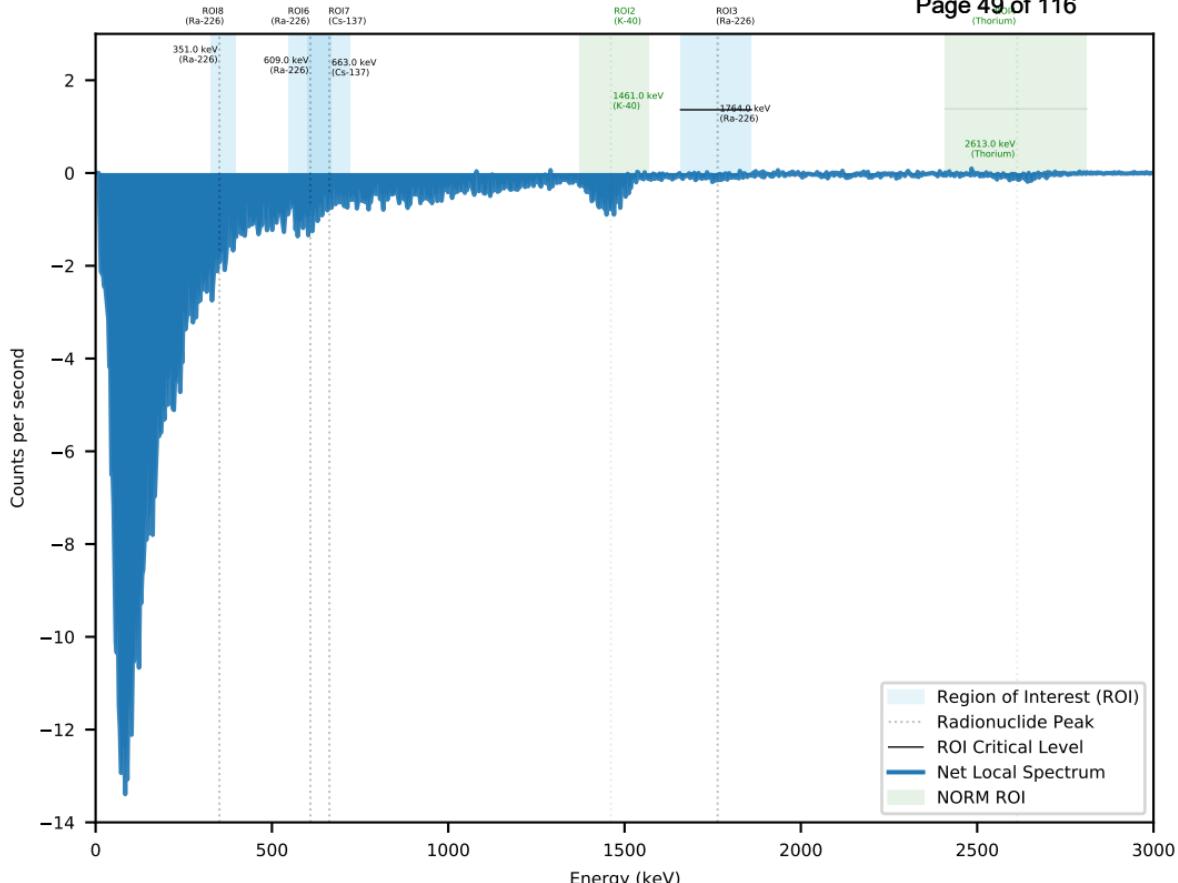
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Page 48 of 116
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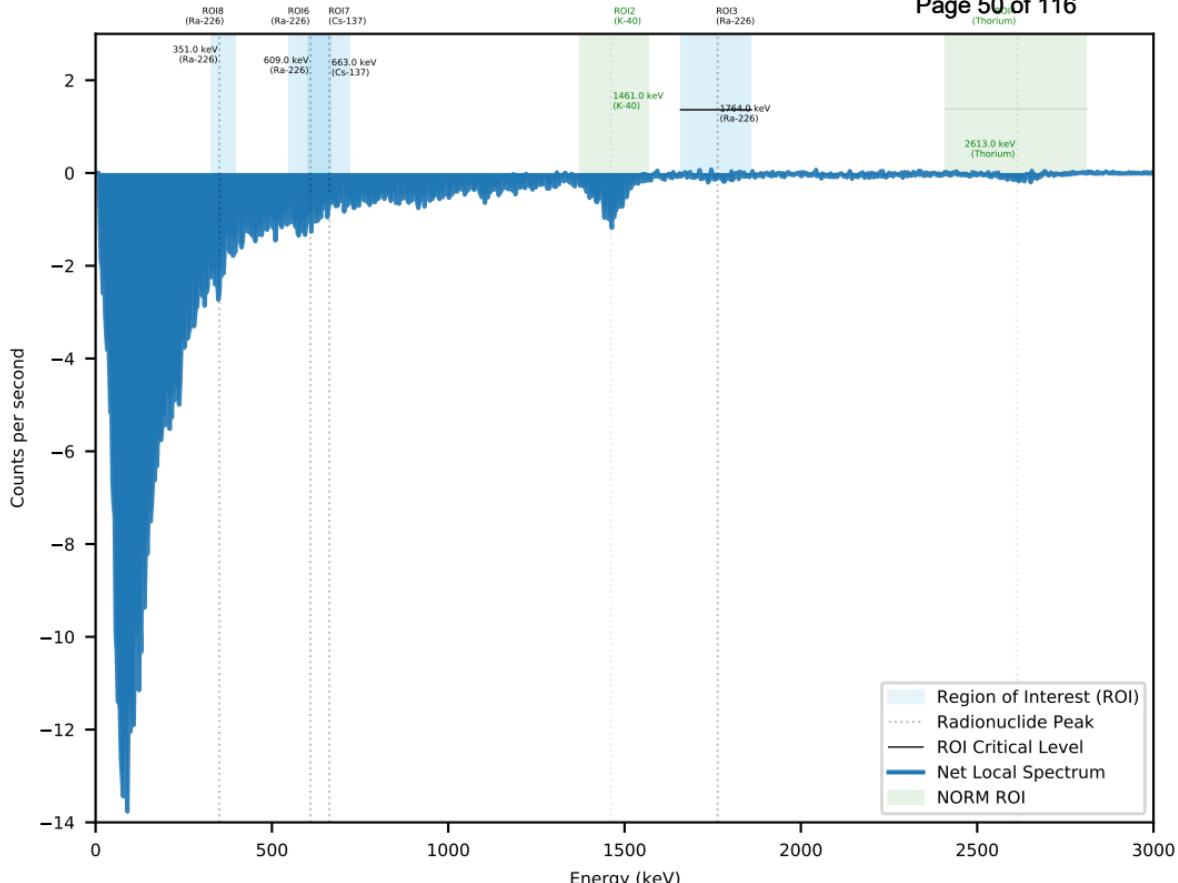
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Page 49 of 116
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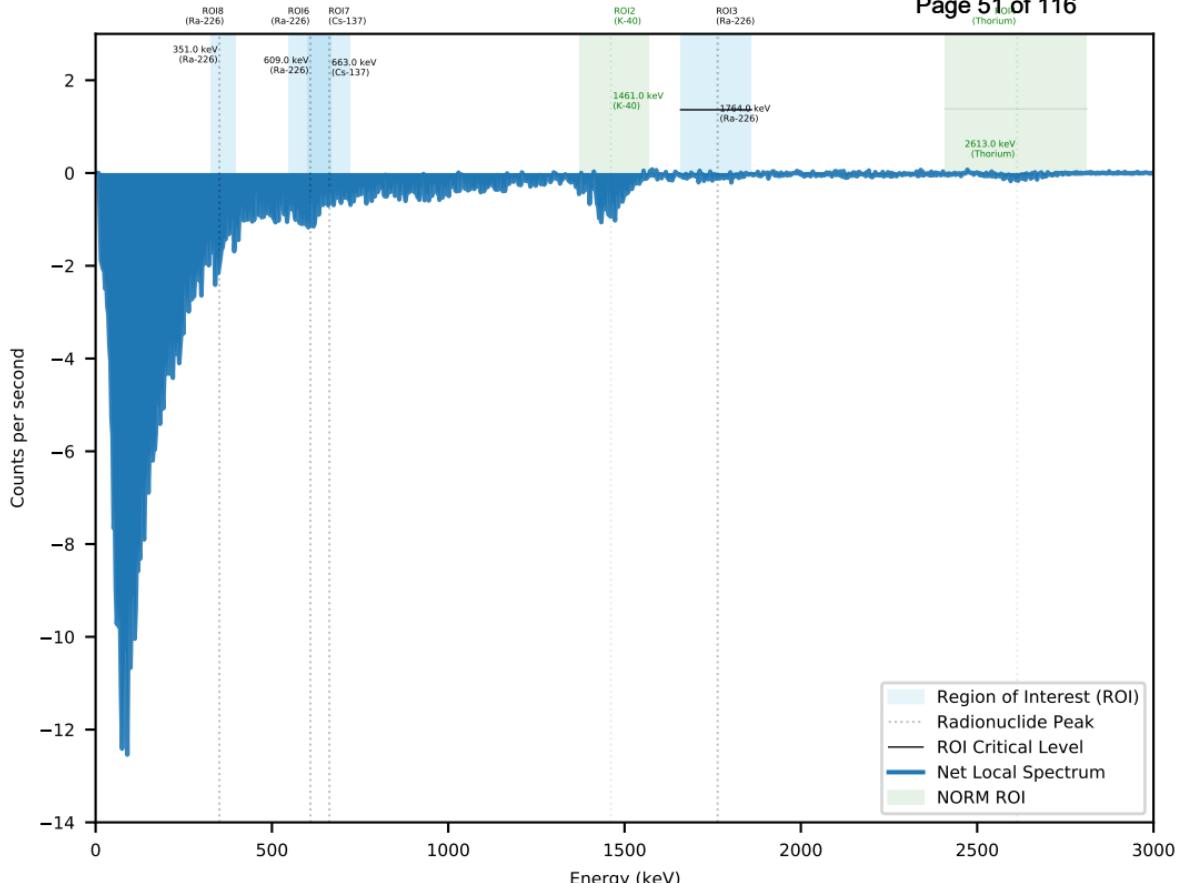
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Page 50 of 116
 (Thorium)



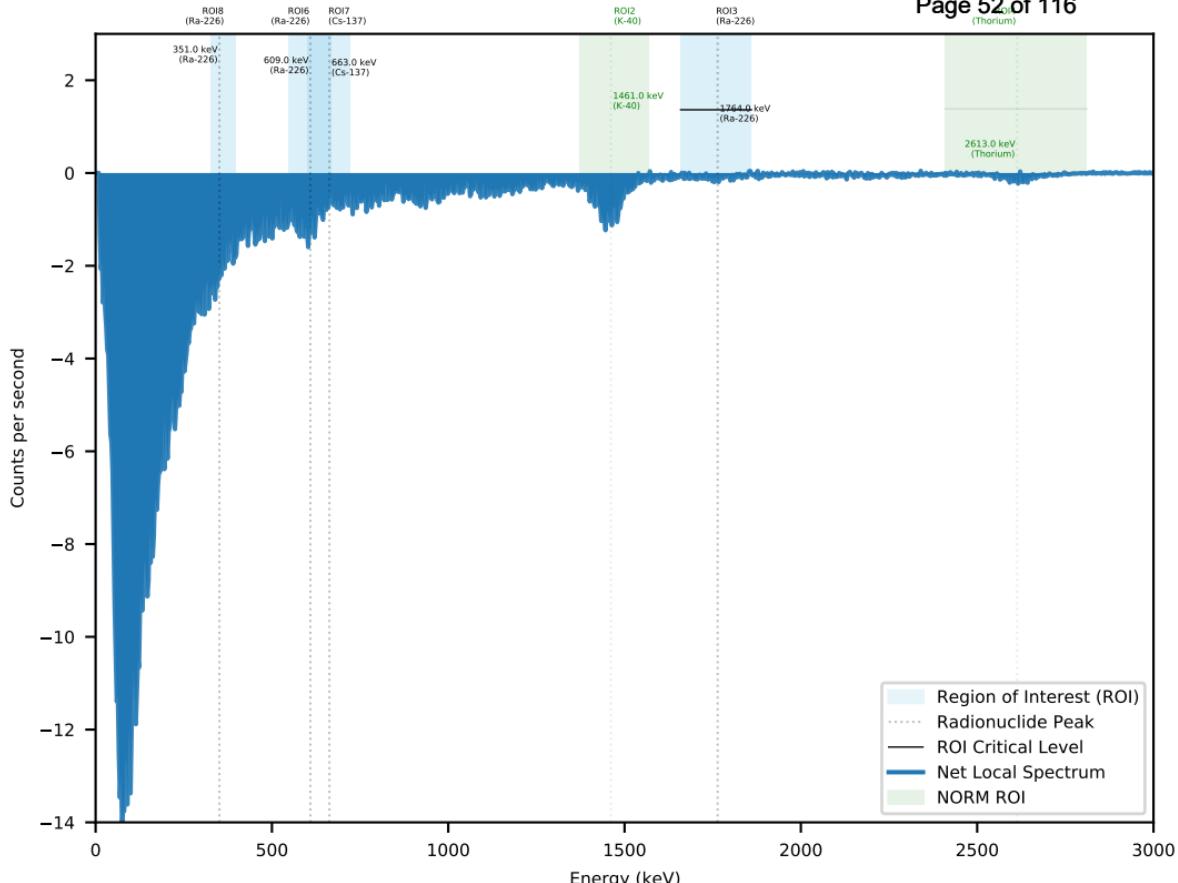
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Page 51 of 116
 (Thorium)



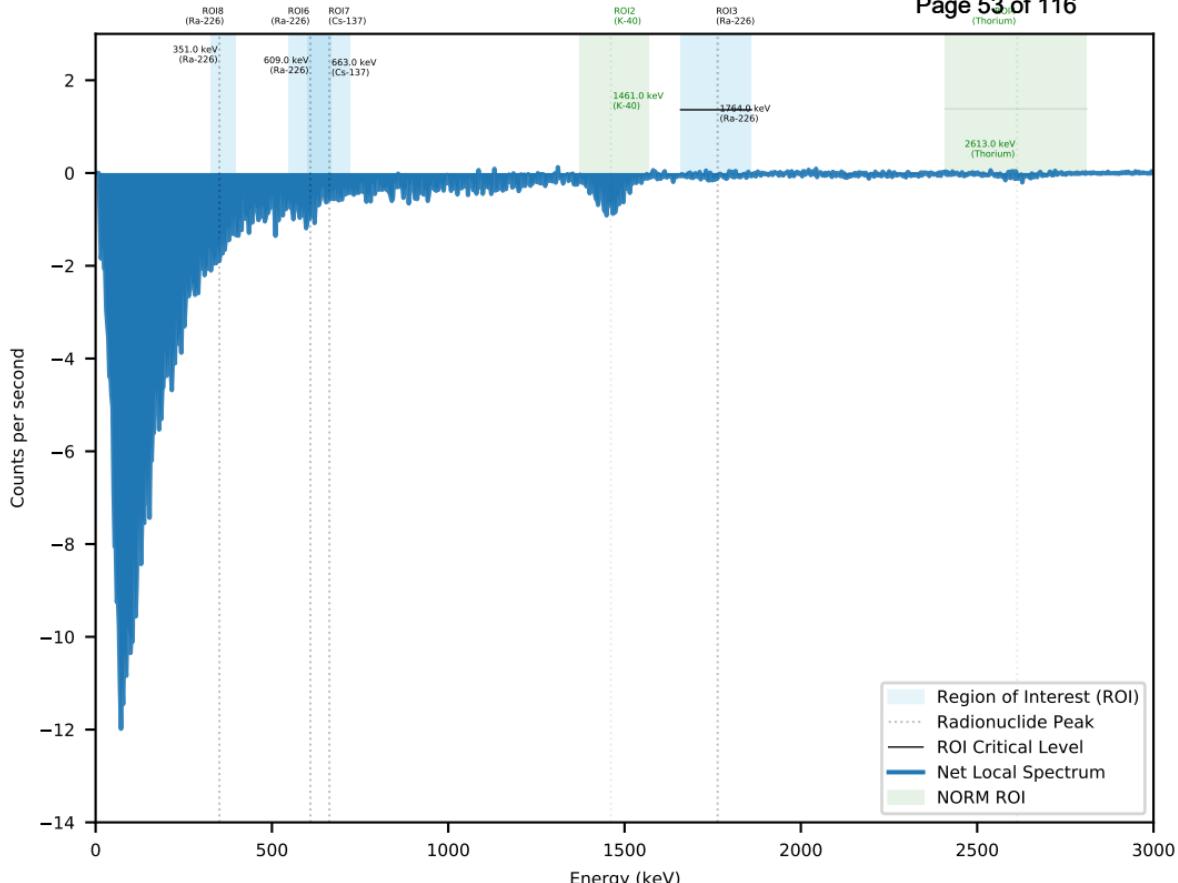
Net Gamma Spectrum, Static Location: 39

Page 52 of 116
 (Thorium)



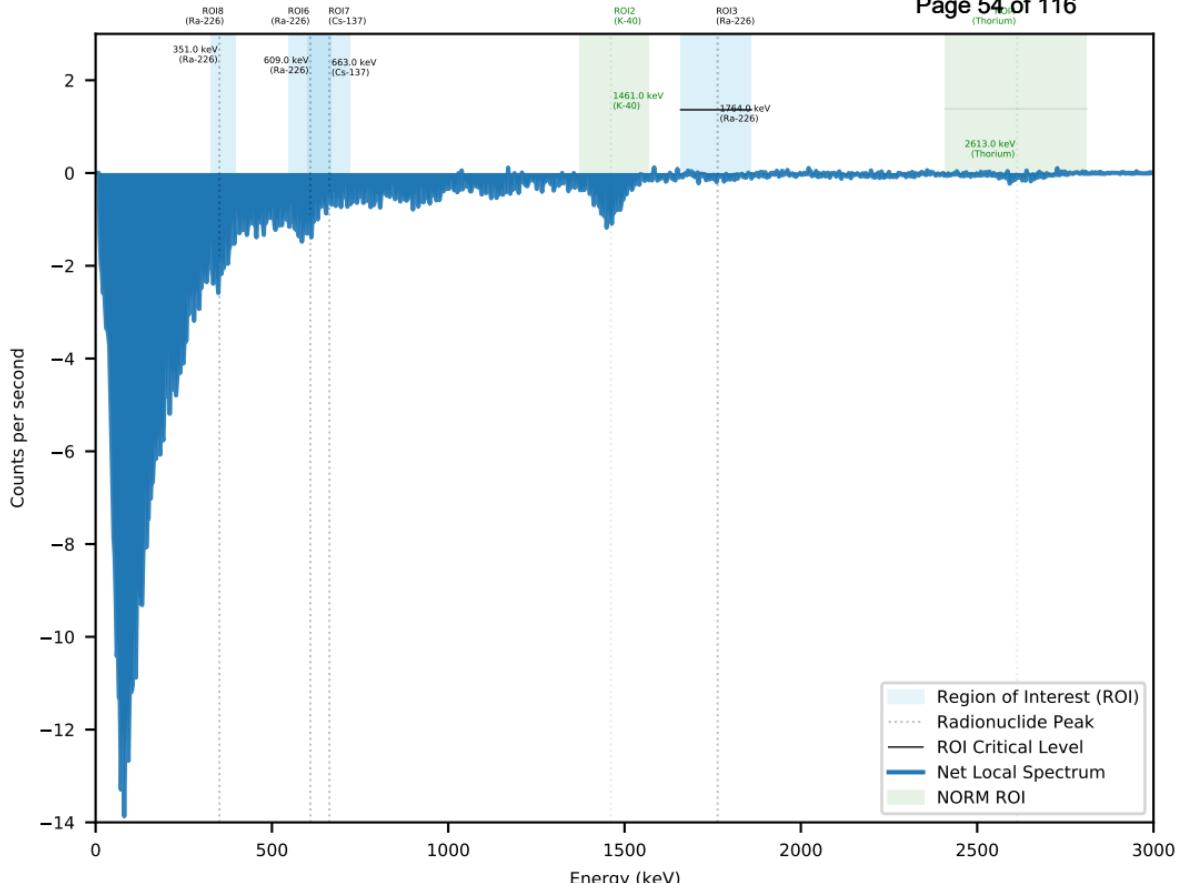
Net Gamma Spectrum, Static Location: 40

Page 53 of 116
 (Thorium)



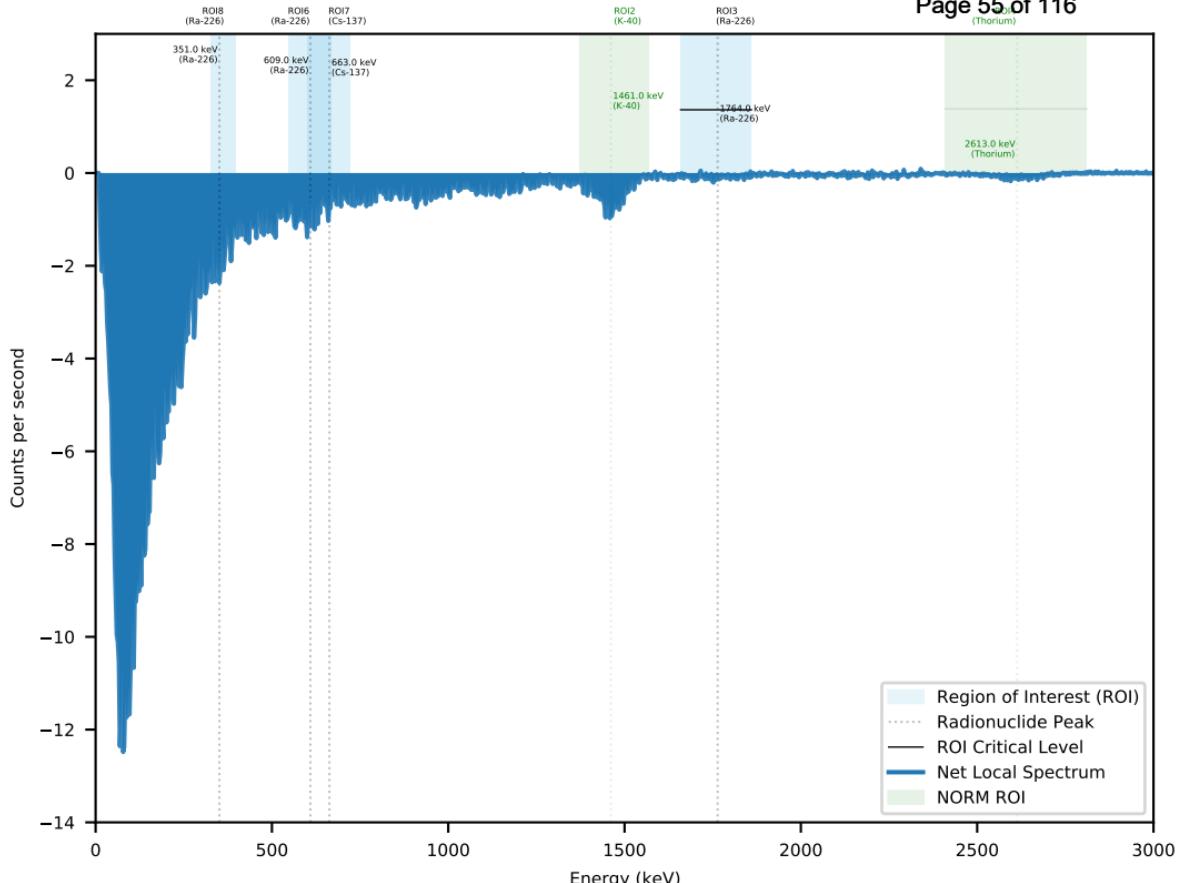
Net Gamma Spectrum, Static Location: 41

Page 54 of 116
 (Thorium)



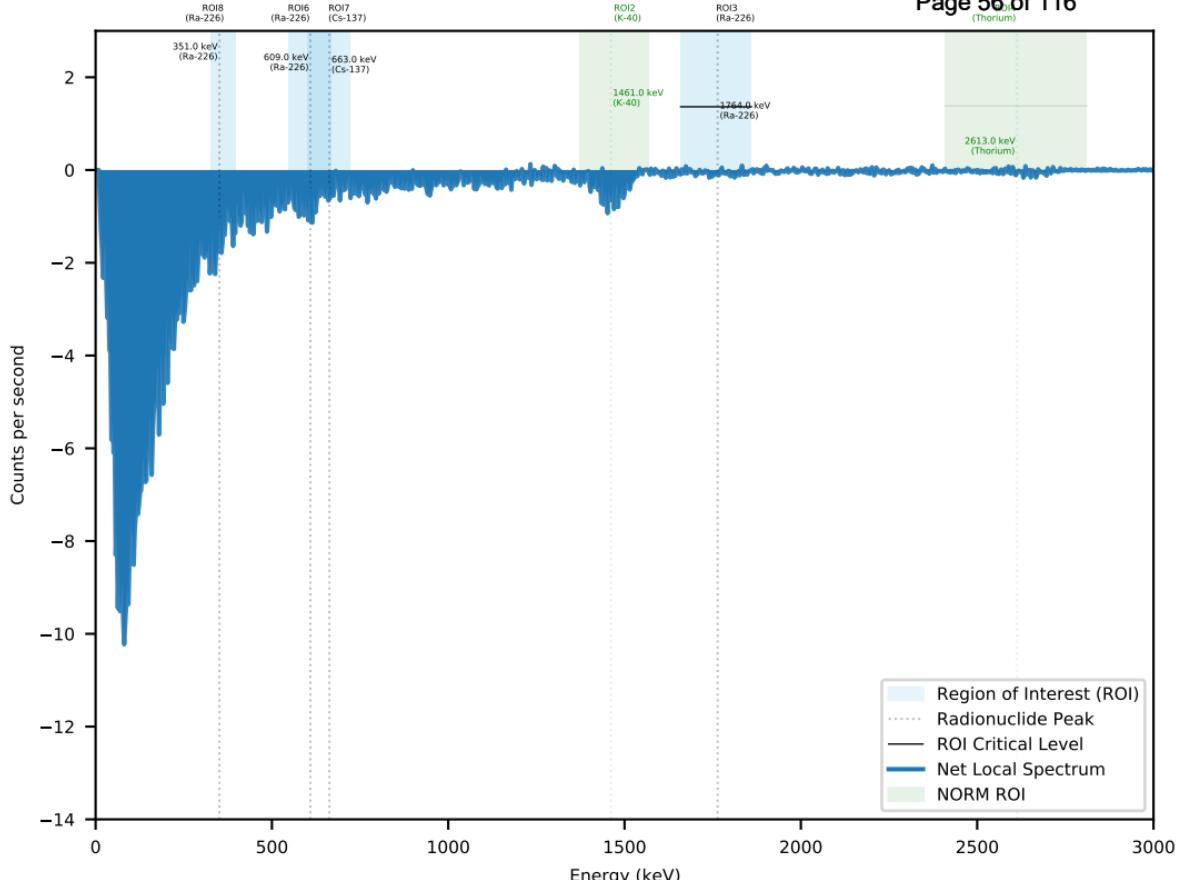
Net Gamma Spectrum, Static Location: 42

Page 55 of 116
 (Thorium)



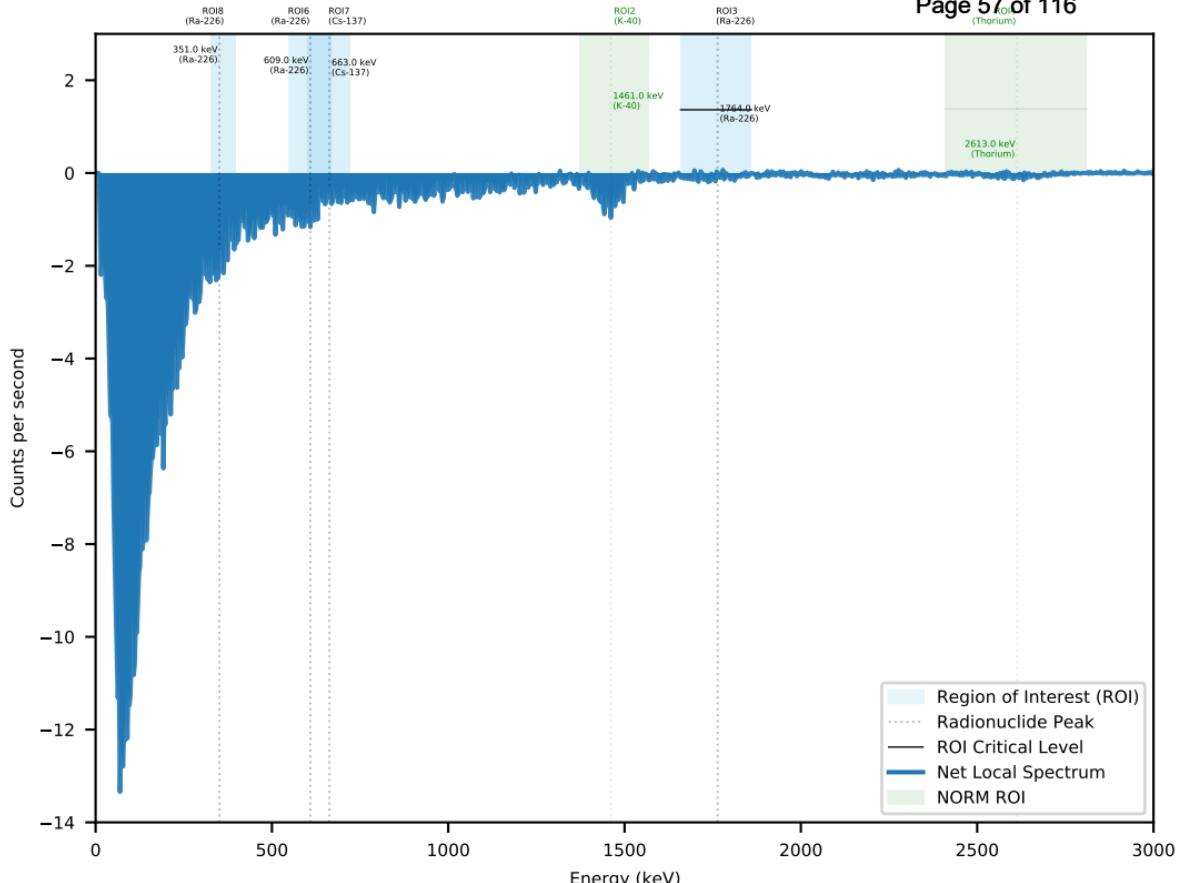
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Page 56 of 116
 (Thorium)



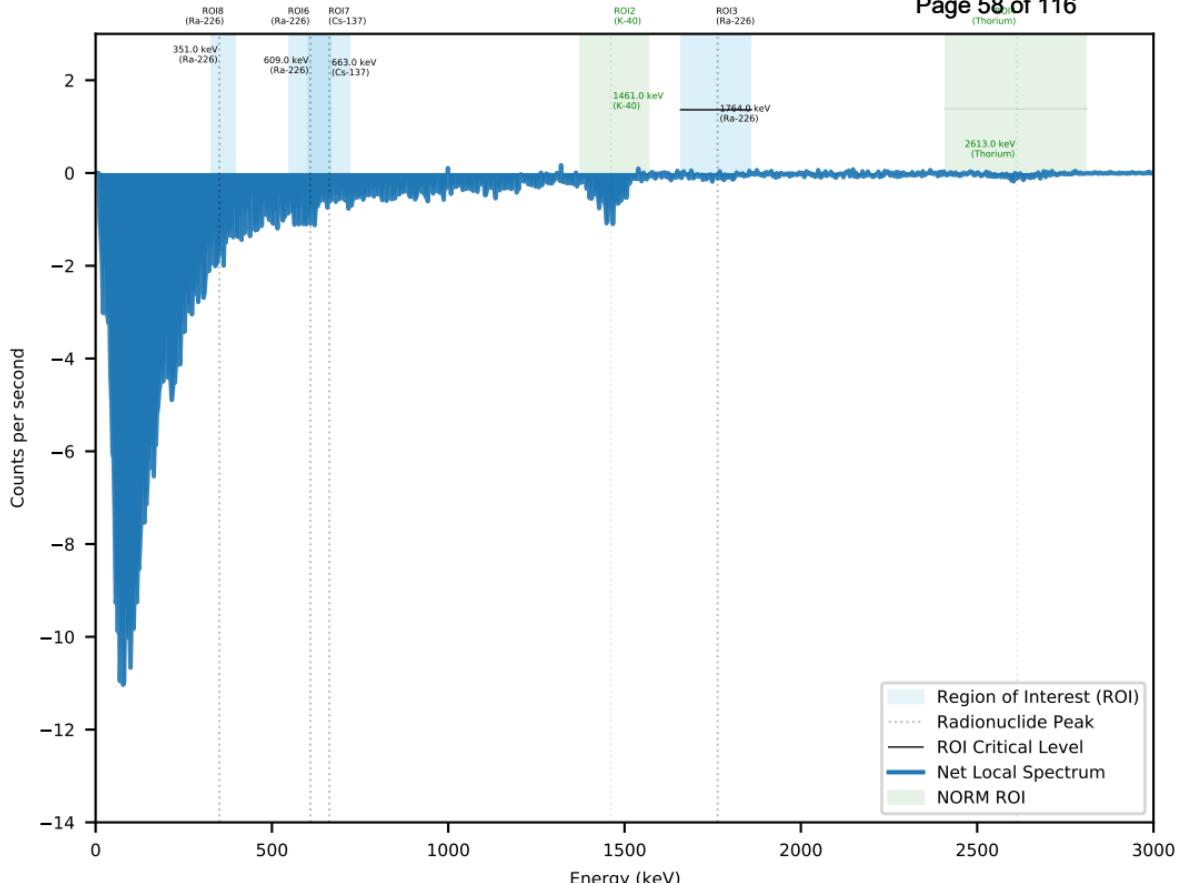
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Page 57 of 116
 (Thorium)



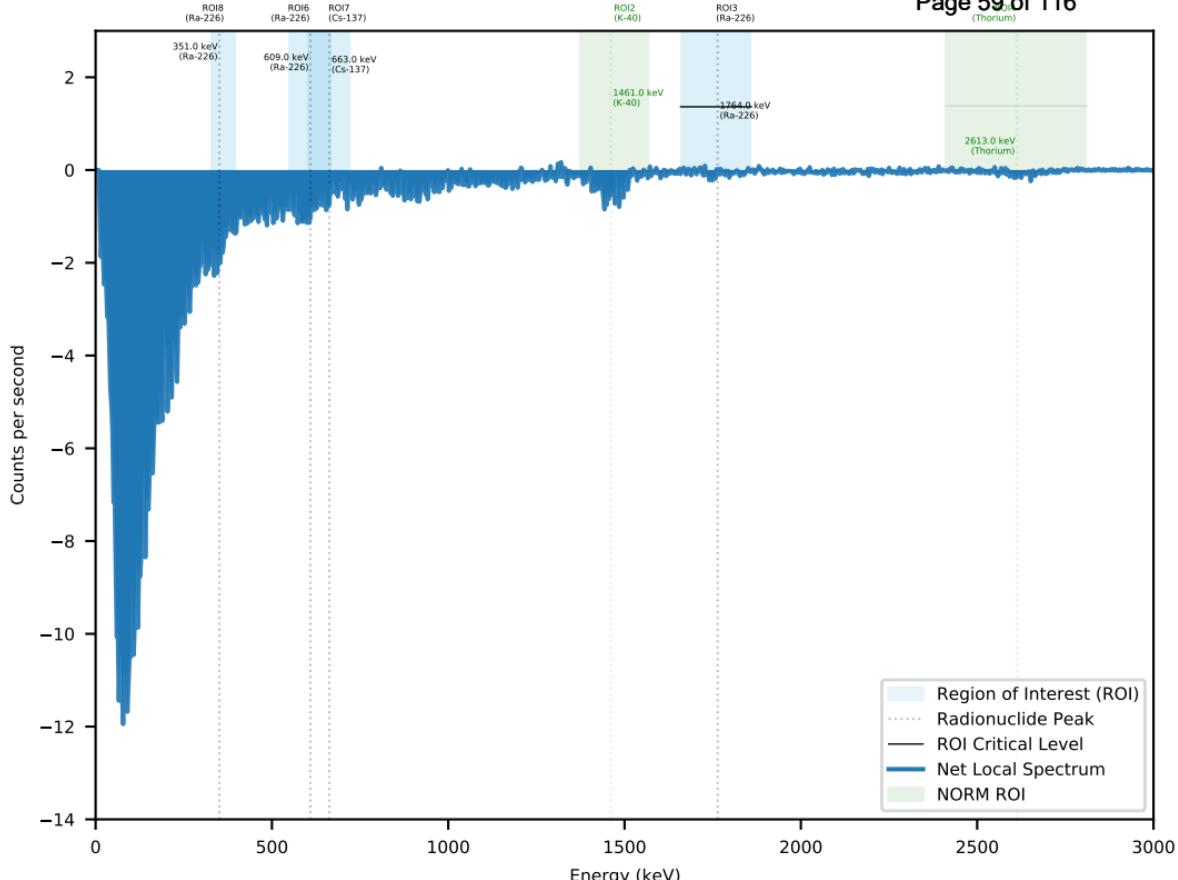
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Page 58 of 116
 (Thorium)



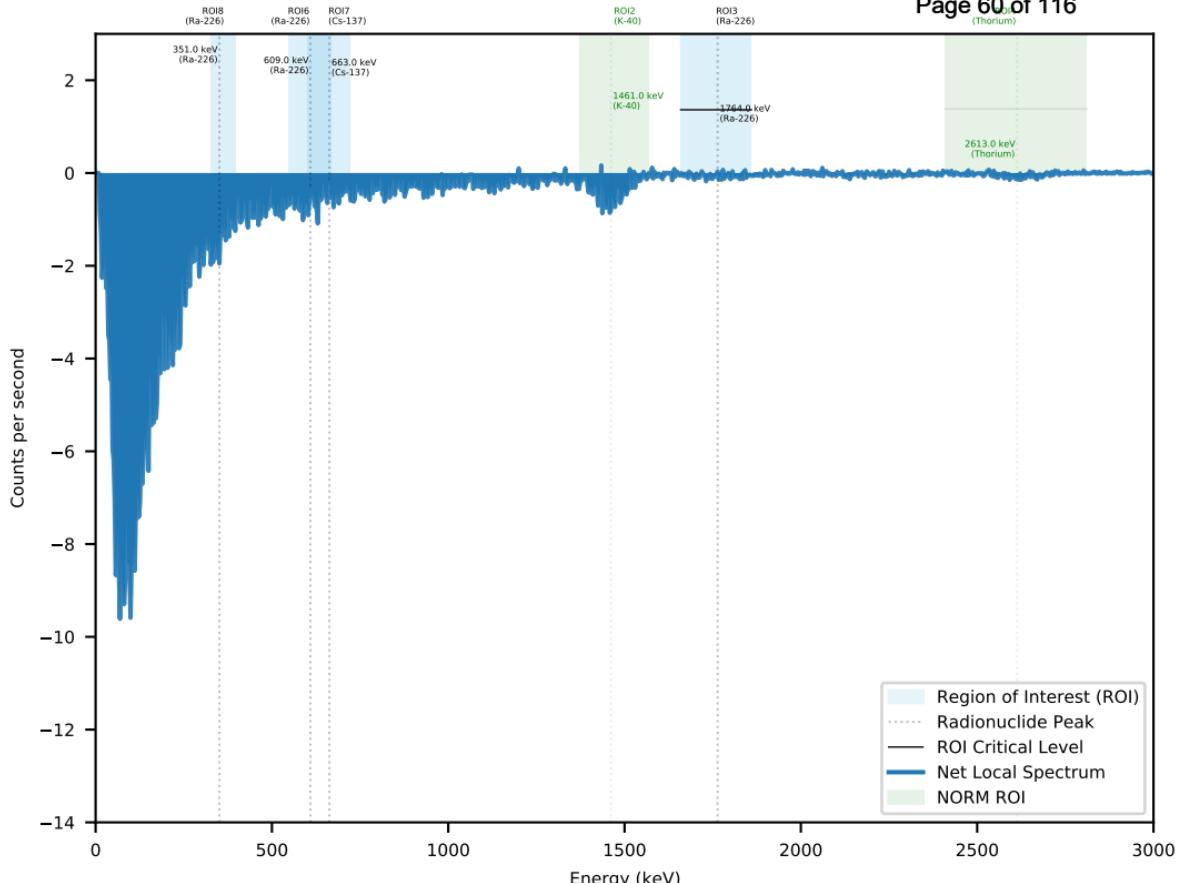
Net Gamma Spectrum, Static Location: 46

Page 59 of 116
 (Thorium)



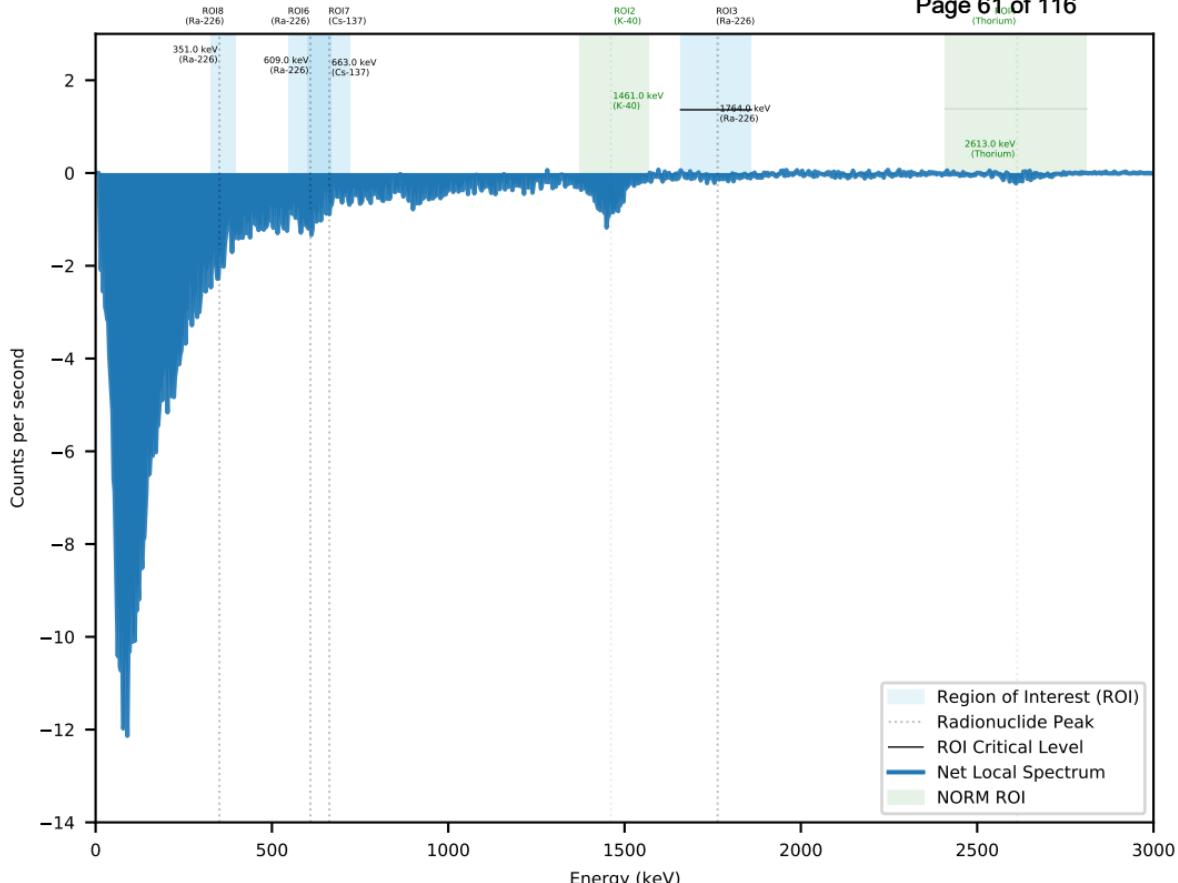
Net Gamma Spectrum, Static Location: 47

Page 60 of 116
 (Thorium)



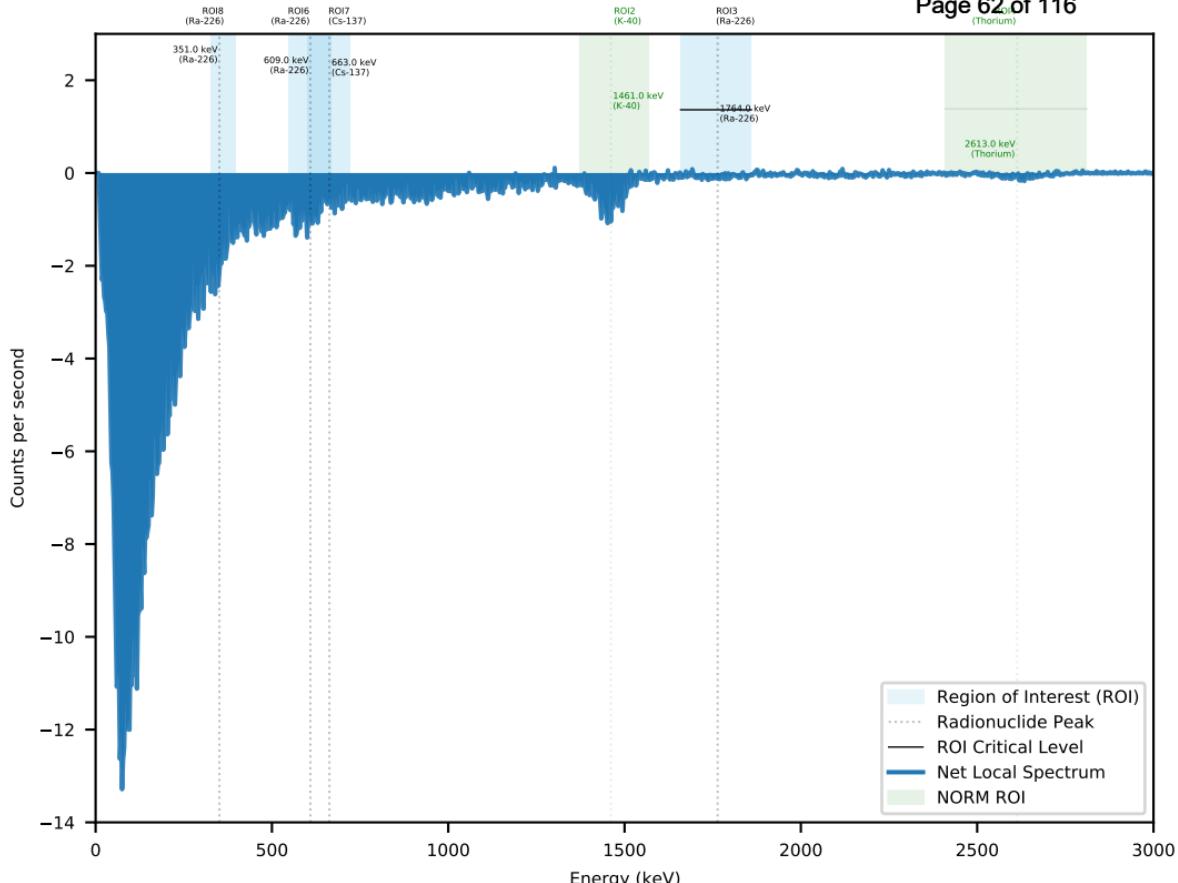
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Page 61 of 116
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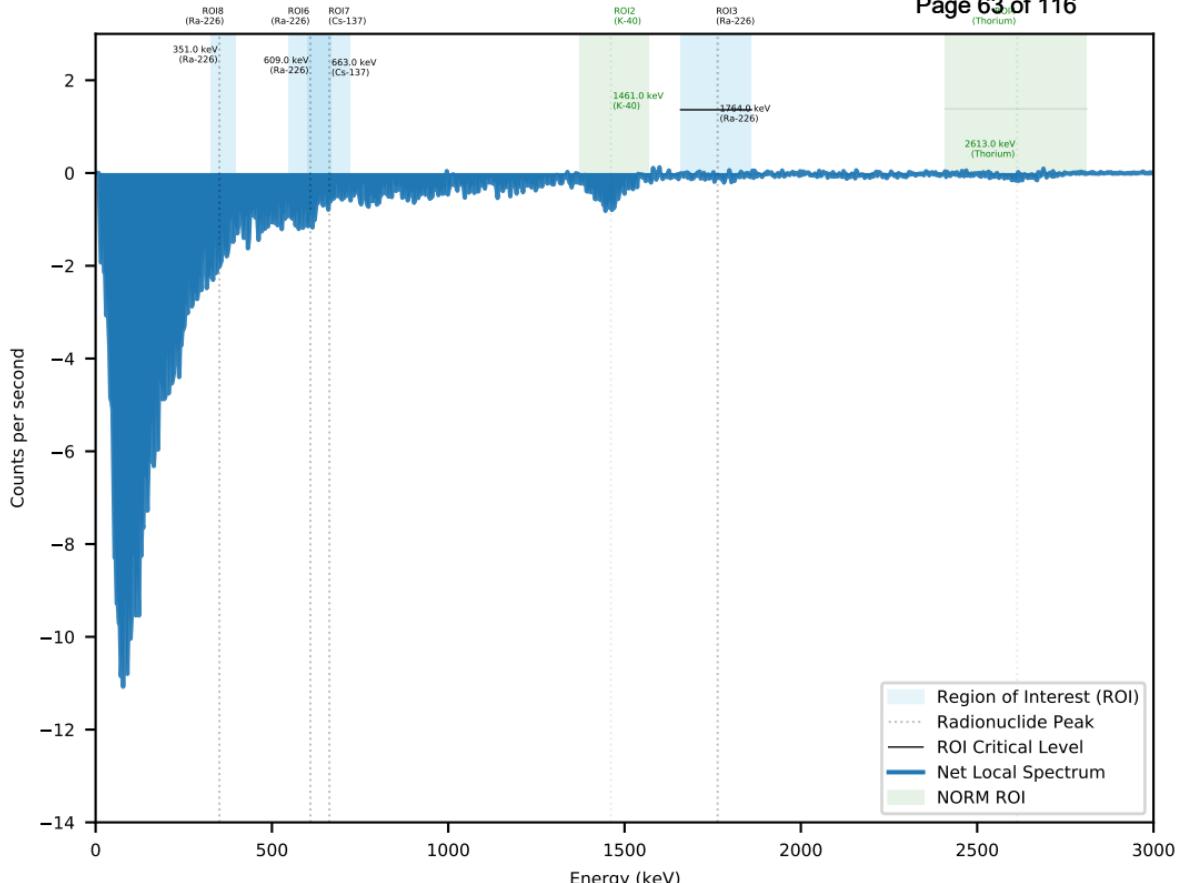
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Page 62 of 116
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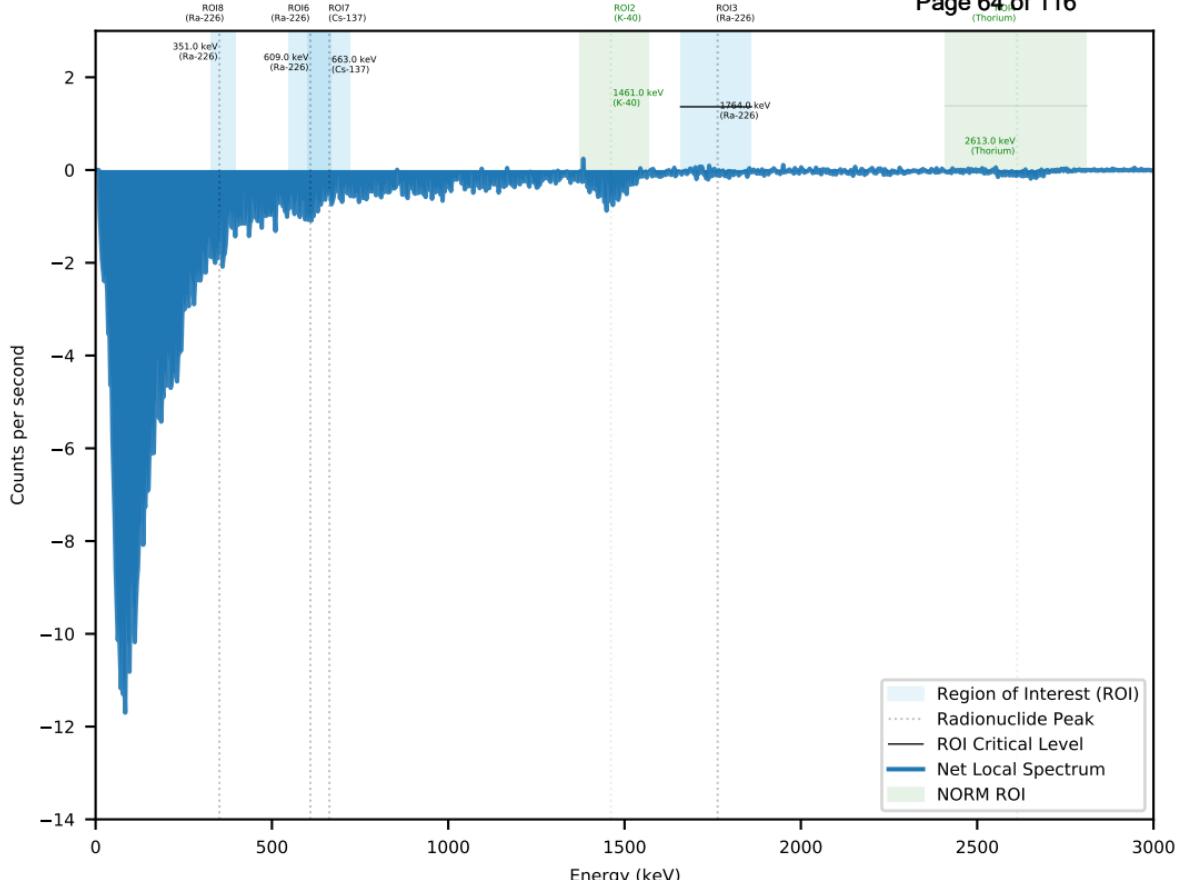
Net Gamma Spectrum, Static Location: 50

Page 63 of 116
 (Thorium)



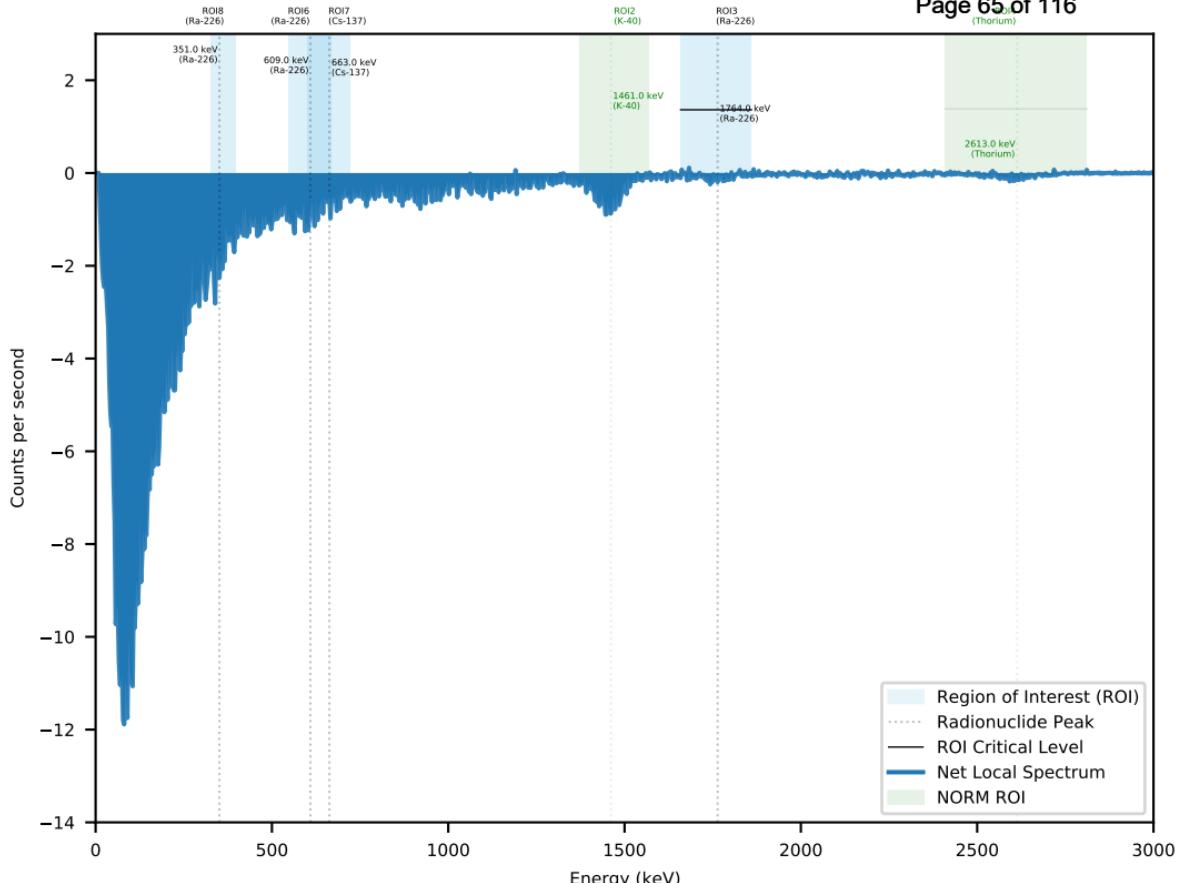
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Page 64 of 116
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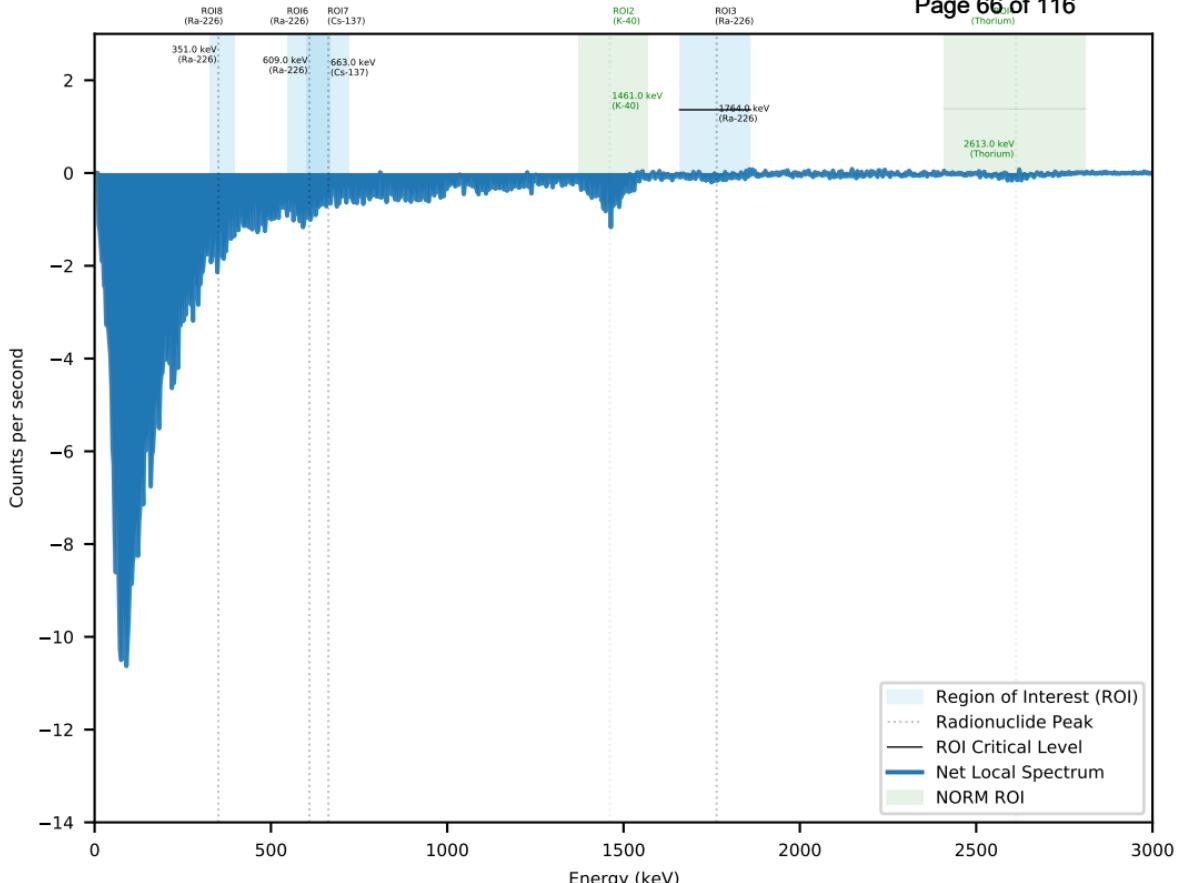
Net Gamma Spectrum, Static Location: 52

Page 65 of 116
 (Thorium)



Net Gamma Spectrum, Static Location: 53

Page 66 of 116
 (Thorium)





Environment Testing America



ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40340-1
Laboratory Sample Delivery Group: GJ46599773
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/6/2021 5:19:21 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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The
Expert

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	10
Definitions/Glossary	11
Method Summary	12
Sample Summary	13
Client Sample Results	14
QC Sample Results	30
QC Association Summary	34
Tracer Carrier Summary	36

Case Narrative

Page 69 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Job ID: 160-40340-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40340-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 70 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Job ID: 160-40340-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 12.2 C.

STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU099A-001 (160-40340-1), HPPG-ESU-TU099A-011 (160-40340-11), HPPG-ESU-TU099A-021 (160-40340-21) and HPPG-F-029 (160-40340-26) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/13/2020, prepared on 12/16/2020 and analyzed on 01/04/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:
HPPG-ESU-TU099A-001 (160-40340-1), HPPG-ESU-TU099A-011 (160-40340-11), HPPG-ESU-TU099A-021 (160-40340-21) and HPPG-F-029 (160-40340-26). The samples contained small rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU099A-001 (160-40340-1), HPPG-ESU-TU099A-002 (160-40340-2), HPPG-ESU-TU099A-003 (160-40340-3), HPPG-ESU-TU099A-004 (160-40340-4), HPPG-ESU-TU099A-005 (160-40340-5), HPPG-ESU-TU099A-006 (160-40340-6), HPPG-ESU-TU099A-007 (160-40340-7), HPPG-ESU-TU099A-008 (160-40340-8), HPPG-ESU-TU099A-009 (160-40340-9), HPPG-ESU-TU099A-010 (160-40340-10), HPPG-ESU-TU099A-011 (160-40340-11), HPPG-ESU-TU099A-012 (160-40340-12), HPPG-ESU-TU099A-013 (160-40340-13), HPPG-ESU-TU099A-014 (160-40340-14), HPPG-ESU-TU099A-015 (160-40340-15), HPPG-ESU-TU099A-016 (160-40340-16), HPPG-ESU-TU099A-017 (160-40340-17), HPPG-ESU-TU099A-018 (160-40340-18), HPPG-ESU-TU099A-019 (160-40340-19), HPPG-ESU-TU099A-020 (160-40340-20), HPPG-ESU-TU099A-021 (160-40340-21), HPPG-ESU-TU099A-022 (160-40340-22), HPPG-ESU-TU099A-023 (160-40340-23), HPPG-ESU-TU099A-024 (160-40340-24), HPPG-ESU-TU099A-025 (160-40340-25), HPPG-F-029 (160-40340-26) and HPPG-F-030 (160-40340-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/13/2020, prepared on 11/20/2020 and analyzed on 12/11/2020 and 12/14/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Case Narrative

Page 71 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Job ID: 160-40340-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Gamma prep batch 489844

The MB z-score for Th-234/U-238 associated with Prep Batch 160-489844 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489844/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

HPPG-ESU-TU099A-002 (160-40340-2)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (MB 160-489844/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

Gamma prep batch 489851

The method blank (MB) z-score associated with Prep Batch 160-489851 is within limits and is stored in the level IV raw data. (MB 160-489851/1-A)

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU (160-40340-14; Th-234 and 160-40340-23; U-235): HPPG-ESU-TU099A-014 (160-40340-14) and HPPG-ESU-TU099A-023 (160-40340-23)

This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

Gamma prep batch 489908

The MB z-score for Bi-214/Ra-226 associated with Prep Batch 160-489908 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489908/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-026

Page 1 of 4

APTM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin
Sample Tech(s): Paul LeBlanc

Sample ID	Collection Information			Matrix	# of Containers	Preservatives (soil)	Preservatives (water)	Comment
	Date	Time	Method					
HPPG-ESU-TU099A-001	11/6/2020	14:34	G	SO	1	16 oz. plastic jar	X	
HPPG-ESU-TU099A-002	11/6/2020	14:37	G	SO	1	16 oz. plastic jar	X	
HPPG-ESU-TU099A-003	11/6/2020	14:41	G	SO	1	16 oz. plastic jar	X	
HPPG-ESU-TU099A-004	11/6/2020	14:44	G	SO	1	16 oz. plastic jar	X	
HPPG-ESU-TU099A-005	11/6/2020	14:48	G	SO	1	16 oz. plastic jar	X	
HPPG-ESU-TU099A-006	11/6/2020	14:52	G	SO	1	16 oz. plastic jar	X	
HPPG-ESU-TU099A-007	11/6/2020	14:57	G	SO	1	16 oz. plastic jar	X	
HPPG-ESU-TU099A-008	11/6/2020	15:01	G	SO	1	16 oz. plastic jar	X	

Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g
21 day ingrowth results only

Turaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I	II	III	Project Specific
Method Codes C = Composite G = Grab									Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WV = Waste Water; CP = Clip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening
Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:				
Lewis, Devin		11/06/2020 16:22	Locked Storage (RKillpack)		11/06/2020 16:22				
Locked Storage (RKillpack)		11/10/2020 13:05	Andrew Murri		11/10/2020 13:05				
Andrew Murri		11/10/2020 13:11	SHIPPED TO LAB Via FedEx		11/11/2020 09:05				

*** Last 3 transfers shown above - Complete list of transfers on last page ***

1
2
3
4
5
6
7
8
9
10
11
12



CHAIN OF CUSTODY

Ref. Document # 501197RSY-026

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin
Sample Tech(s): Paul LeBlanc

Sample ID	Collection Information				# of Containers	Preservatives (soil)	Preservatives (water)	Comment
	Date	Time	Method	Matrix				
HPPG-ESU-TU099A-009	11/6/2020	15:05	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-010	11/6/2020	15:09	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-011	11/6/2020	15:12	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-012	11/6/2020	15:16	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-013	11/6/2020	15:20	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-014	11/6/2020	15:24	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-015	11/6/2020	15:27	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-016	11/6/2020	15:30	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-017	11/6/2020	15:32	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-018	11/6/2020	15:34	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-019	11/6/2020	15:35	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-020	11/6/2020	15:36	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-021	11/6/2020	15:39	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-022	11/6/2020	15:36	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-023	11/6/2020	15:40	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-024	11/6/2020	15:41	G	SO	1	16 oz. plastic jar	X	4 GJ46599773
HPPG-ESU-TU099A-025	11/6/2020	15:43	G	SO	1	16 oz. plastic jar	X	4 GJ46599773



CHAIN OF CUSTODY

Ref. Document # 501197RSY-026

Page 3 of 4

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

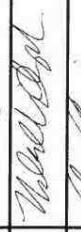
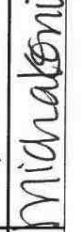
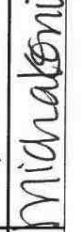
Project Manager: Lisa Bercik
Phone #: (619)213-3389
Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin
Sample Tech(s): Paul LeBlanc

Analysis Requested							
Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma							
Strontium-90 (EPA 905 MOD)							
Project Number:	501197	Hunters Point Naval Shipyard: Parcel					
Project Name:	G Remedial Action						
Project Location:	San Francisco, CA						
Purchase Order #:	1159058						
Shipment/Pickup Date:	11/10/2020						
Waybill Number:	496702055965						
Test America (St. Louis Lab)							
Lab Destination:	13715 Rider Trail North Earth City, MO 63046						
Lab Contact Name/ph #	Rhoeda Ridenbower (314)298-8566						
Preservatives (water)		Preservatives (soil)		Comment			
Matrix	# of Containers	Matrix	# of Containers	Dose Rate uR/Hr	Evidence Bag ID		
Collection Information							
Sample ID	Date	Time	Method	# of Containers	Container Type		
HPPG-F-029	11/6/2020	14:34	G	SO 1	16 oz. plastic jar	X	X
HPPG-F-030	11/6/2020	14:57	G	SO 1	16 oz. plastic jar	X	

All Transfers for COC 501197RSY-026

Page 4 of 4

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/06/2020 16:22	Locked Storage (RKilpack)		11/06/2020 16:22
Locked Storage (RKilpack)		11/10/2020 13:05	Andrew Murri		11/10/2020 13:05
Andrew Murri		11/10/2020 13:11	SHIPPEDTOLAB via FedEx	 Michael Ning	11/10/2020 09:05

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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40340-1

SDG Number: GJ46599773

Login Number: 40340**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Page 77 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Qualifiers

Rad

Qualifier

Qualifier Description

U Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Page 78 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Page 79 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40340-1	HPPG-ESU-TU099A-001	Solid	11/06/20 14:34	11/11/20 09:05	
160-40340-2	HPPG-ESU-TU099A-002	Solid	11/06/20 14:37	11/11/20 09:05	
160-40340-3	HPPG-ESU-TU099A-003	Solid	11/06/20 14:41	11/11/20 09:05	
160-40340-4	HPPG-ESU-TU099A-004	Solid	11/06/20 14:44	11/11/20 09:05	
160-40340-5	HPPG-ESU-TU099A-005	Solid	11/06/20 14:48	11/11/20 09:05	
160-40340-6	HPPG-ESU-TU099A-006	Solid	11/06/20 14:52	11/11/20 09:05	
160-40340-7	HPPG-ESU-TU099A-007	Solid	11/06/20 14:57	11/11/20 09:05	
160-40340-8	HPPG-ESU-TU099A-008	Solid	11/06/20 15:01	11/11/20 09:05	
160-40340-9	HPPG-ESU-TU099A-009	Solid	11/06/20 15:05	11/11/20 09:05	
160-40340-10	HPPG-ESU-TU099A-010	Solid	11/06/20 15:09	11/11/20 09:05	
160-40340-11	HPPG-ESU-TU099A-011	Solid	11/06/20 15:12	11/11/20 09:05	
160-40340-12	HPPG-ESU-TU099A-012	Solid	11/06/20 15:16	11/11/20 09:05	
160-40340-13	HPPG-ESU-TU099A-013	Solid	11/06/20 15:20	11/11/20 09:05	
160-40340-14	HPPG-ESU-TU099A-014	Solid	11/06/20 15:24	11/11/20 09:05	
160-40340-15	HPPG-ESU-TU099A-015	Solid	11/06/20 15:27	11/11/20 09:05	
160-40340-16	HPPG-ESU-TU099A-016	Solid	11/06/20 15:30	11/11/20 09:05	
160-40340-17	HPPG-ESU-TU099A-017	Solid	11/06/20 15:32	11/11/20 09:05	
160-40340-18	HPPG-ESU-TU099A-018	Solid	11/06/20 15:34	11/11/20 09:05	
160-40340-19	HPPG-ESU-TU099A-019	Solid	11/06/20 15:35	11/11/20 09:05	
160-40340-20	HPPG-ESU-TU099A-020	Solid	11/06/20 15:36	11/11/20 09:05	
160-40340-21	HPPG-ESU-TU099A-021	Solid	11/06/20 15:39	11/11/20 09:05	
160-40340-22	HPPG-ESU-TU099A-022	Solid	11/06/20 15:36	11/11/20 09:05	
160-40340-23	HPPG-ESU-TU099A-023	Solid	11/06/20 15:40	11/11/20 09:05	
160-40340-24	HPPG-ESU-TU099A-024	Solid	11/06/20 15:41	11/11/20 09:05	
160-40340-25	HPPG-ESU-TU099A-025	Solid	11/06/20 15:43	11/11/20 09:05	
160-40340-26	HPPG-F-029	Solid	11/06/20 14:34	11/11/20 09:05	
160-40340-27	HPPG-F-030	Solid	11/06/20 14:57	11/11/20 09:05	

Client Sample Results

Page 80 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-001

Lab Sample ID: 160-40340-1

Matrix: Solid

Date Collected: 11/06/20 14:34

Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.0616	U	0.167	0.167	0.160	0.133	pCi/g	12/16/20 14:29	01/04/21 13:53	1
<i>Carrier</i>	%Yield	Qualifier	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
Sr Carrier	96.4		40 - 110					12/16/20 14:29	01/04/21 13:53	1
Y Carrier	93.1		40 - 110					12/16/20 14:29	01/04/21 13:53	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.137		0.235	0.235		0.125	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Actinium-227	-0.336	U	0.525	0.526		0.376	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Bismuth-212	0.238	U	0.742	0.743		0.587	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Bismuth-214	0.269		0.119	0.123		0.169	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Cesium-137	0.00248	U	0.0660	0.0660	0.0700	0.0542	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Lead-210	1.02		1.36	1.37		0.900	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Lead-212	0.298		0.0800	0.0874		0.0404	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Lead-214	0.306		0.106	0.112		0.0585	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Potassium-40	6.70		1.34	1.55		0.381	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Protactinium-231	-0.901	U	2.56	2.57		2.08	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Protactinium-234	0.0677	U	0.101	0.101		0.262	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Radium-226	0.269		0.119	0.123	0.200	0.169	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Radium-228	0.137		0.235	0.235		0.125	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Thallium-208	0.0942		0.0514	0.0525		0.0495	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Thorium 228	0.298		0.0800	0.0874		0.0404	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Thorium-232	0.137		0.235	0.235		0.125	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Thorium-234	-0.513	U	0.784	0.787		1.07	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Uranium-235	0.0391	U	0.176	0.176		0.482	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Uranium-238	-0.513	U	0.784	0.787		1.07	pCi/g	11/20/20 14:56	12/11/20 10:39	1

Client Sample ID: HPPG-ESU-TU099A-002

Lab Sample ID: 160-40340-2

Matrix: Solid

Date Collected: 11/06/20 14:37

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.573		0.194	0.202		0.117	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Actinium-227	0.132	U	0.328	0.329		0.293	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Bismuth-212	-0.0435	U	0.932	0.932		0.764	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Bismuth-214	0.588		0.146	0.158		0.0403	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Cesium-137	-0.0542	U	0.0954	0.0955	0.0700	0.0745	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Lead-210	0.779	U	1.44	1.45		0.968	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Lead-212	0.331		0.0864	0.0931		0.0453	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Lead-214	0.411		0.114	0.121		0.0448	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Potassium-40	5.70		1.46	1.57		0.433	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Protactinium-231	-0.867	U	2.99	2.99		2.43	pCi/g	11/20/20 14:56	12/11/20 10:42	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 81 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-002**Lab Sample ID: 160-40340-2**

Matrix: Solid

Date Collected: 11/06/20 14:37

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.109	U	0.249	0.249		0.148	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Radium-226	0.588		0.146	0.158	0.200	0.0403	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Radium-228	0.573		0.194	0.202		0.117	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Thallium-208	0.150		0.0816	0.0830		0.0373	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Thorium 228	0.331		0.0864	0.0931		0.0453	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Thorium-232	0.573		0.194	0.202		0.117	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Thorium-234	0.515		0.500	0.503		0.377	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Uranium-235	-0.200	U	0.402	0.402		0.432	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Uranium-238	0.515		0.500	0.503		0.377	pCi/g	11/20/20 14:56	12/11/20 10:42	1

Client Sample ID: HPPG-ESU-TU099A-003**Lab Sample ID: 160-40340-3**

Matrix: Solid

Date Collected: 11/06/20 14:41

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.251		0.106	0.109		0.122	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Actinium-227	-0.0739	U	0.537	0.537		0.330	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Bismuth-212	-0.00426	U	0.533	0.533		0.459	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Bismuth-214	0.0203	U	0.0402	0.0402		0.157	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Cesium-137	0.0180	U	0.0773	0.0773	0.0700	0.0618	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Lead-210	0.584	U	1.19	1.19		0.820	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Lead-212	0.253		0.0757	0.0824		0.0358	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Lead-214	0.235		0.104	0.107		0.0700	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Potassium-40	6.52		1.39	1.54		0.272	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Protactinium-231	0.252	U	1.27	1.27		1.98	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Protactinium-234	-0.0789	U	0.204	0.204		0.164	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Radium-226	0.0203	U	0.0402	0.0402	0.200	0.157	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Radium-228	0.251		0.106	0.109		0.122	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Thallium-208	0.163		0.0665	0.0686		0.0245	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Thorium 228	0.253		0.0757	0.0824		0.0358	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Thorium-232	0.251		0.106	0.109		0.122	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Thorium-234	0.460		0.425	0.428		0.347	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Uranium-235	-0.154	U	0.251	0.252		0.283	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Uranium-238	0.460		0.425	0.428		0.347	pCi/g	11/20/20 14:56	12/11/20 10:40	1

Client Sample ID: HPPG-ESU-TU099A-004**Lab Sample ID: 160-40340-4**

Matrix: Solid

Date Collected: 11/06/20 14:44

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.345		0.204	0.207		0.0890	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Actinium-227	0.0809	U	0.141	0.142		0.294	pCi/g	11/20/20 14:56	12/11/20 12:37	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 82 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-004

Lab Sample ID: 160-40340-4

Matrix: Solid

Date Collected: 11/06/20 14:44

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-212	-0.444	U	0.506	0.508		0.771	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Bismuth-214	0.472		0.111	0.121		0.0417	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Cesium-137	0.0200	U	0.0411	0.0411	0.0700	0.0317	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Lead-210	0.574	U	1.27	1.27		1.02	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Lead-212	0.371		0.0738	0.0881		0.0342	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Lead-214	0.379		0.0968	0.105		0.0545	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Potassium-40	8.77		1.21	1.51		0.257	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Protactinium-231	0.000	U	0.469	0.469		1.80	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Protactinium-234	0.0736	U	0.166	0.166		0.184	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Radium-226	0.472		0.111	0.121	0.200	0.0417	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Radium-228	0.345		0.204	0.207		0.0890	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Thallium-208	0.128		0.0404	0.0425		0.0145	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Thorium 228	0.371		0.0738	0.0881		0.0342	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Thorium-232	0.345		0.204	0.207		0.0890	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Thorium-234	0.501		0.344	0.348		0.244	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Uranium-235	0.0135	U	0.145	0.145		0.327	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Uranium-238	0.501		0.344	0.348		0.244	pCi/g	11/20/20 14:56	12/11/20 12:37	1

Client Sample ID: HPPG-ESU-TU099A-005

Lab Sample ID: 160-40340-5

Matrix: Solid

Date Collected: 11/06/20 14:48

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.357		0.124	0.129		0.0237	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Actinium-227	0.0530	U	0.300	0.300		0.262	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Bismuth-212	0.338	U	0.568	0.569		0.434	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Bismuth-214	0.314		0.0861	0.0921		0.0226	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Cesium-137	-0.00182	U	0.0429	0.0429	0.0700	0.0352	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Lead-210	0.594	U	0.992	0.995		0.697	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Lead-212	0.321		0.0910	0.100		0.0434	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Lead-214	0.413		0.0957	0.105		0.0323	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Potassium-40	7.27		1.12	1.35		0.257	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Protactinium-231	0.0000000	U	2.20	2.20		1.81	pCi/g	11/20/20 15:32	12/14/20 05:56	1
	439									
Protactinium-234	0.0127	U	0.0186	0.0186		0.150	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Radium-226	0.314		0.0861	0.0921	0.200	0.0226	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Radium-228	0.357		0.124	0.129		0.0237	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Thallium-208	0.102		0.0408	0.0422		0.0178	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Thorium 228	0.321		0.0910	0.100		0.0434	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Thorium-232	0.357		0.124	0.129		0.0237	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Thorium-234	-0.100	U	0.713	0.713		0.589	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Uranium-235	-0.00492	U	0.0147	0.0147		0.242	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Uranium-238	-0.100	U	0.713	0.713		0.589	pCi/g	11/20/20 15:32	12/14/20 05:56	1

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Client Sample Results

Page 83 of 116

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40340-1
 SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-006
Lab Sample ID: 160-40340-6
Matrix: Solid

Date Collected: 11/06/20 14:52

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.256		0.202	0.204		0.110	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Actinium-227	0.0828	U	0.380	0.380		0.361	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Bismuth-212	-0.330	U	0.982	0.983		0.782	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Bismuth-214	0.319		0.134	0.139		0.0536	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Cesium-137	0.0765		0.0458	0.0466	0.0700	0.0243	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Lead-210	1.43		1.50	1.51		0.984	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Lead-212	0.0312	U	0.134	0.134		0.109	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Lead-214	0.420		0.122	0.132		0.0621	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Potassium-40	7.83		1.40	1.66		0.306	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Protactinium-231	-0.0000000	U	2.79	2.79		2.30	pCi/g	11/20/20 15:32	12/11/20 22:04	1
	153									
Protactinium-234	-0.110	U	0.327	0.327		0.266	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Radium-226	0.319		0.134	0.139	0.200	0.0536	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Radium-228	0.256		0.202	0.204		0.110	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Thallium-208	0.129		0.0715	0.0730		0.0304	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Thorium 228	0.0312	U	0.134	0.134		0.109	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Thorium-232	0.256		0.202	0.204		0.110	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Thorium-234	-0.230	U	1.06	1.06		0.877	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Uranium-235	-0.225	U	0.562	0.562		0.479	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Uranium-238	-0.230	U	1.06	1.06		0.877	pCi/g	11/20/20 15:32	12/11/20 22:04	1

Client Sample ID: HPPG-ESU-TU099A-007
Lab Sample ID: 160-40340-7
Matrix: Solid

Date Collected: 11/06/20 14:57

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.341		0.145	0.149		0.0361	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Actinium-227	-0.0343	U	0.469	0.469		0.290	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Bismuth-212	-0.345	U	0.831	0.831		0.650	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Bismuth-214	0.438		0.145	0.152		0.0562	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Cesium-137	0.0160	U	0.0531	0.0532	0.0700	0.0417	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Lead-210	-0.627	U	1.72	1.72		1.43	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Lead-212	0.274		0.0753	0.0805		0.0385	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Lead-214	0.394		0.111	0.118		0.0416	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Potassium-40	5.45		1.21	1.33		0.219	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Protactinium-231	-0.816	U	3.06	3.06		2.49	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Protactinium-234	0.0719	U	0.233	0.233		0.189	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Radium-226	0.438		0.145	0.152	0.200	0.0562	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Radium-228	0.341		0.145	0.149		0.0361	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Thallium-208	0.146		0.0543	0.0563		0.0158	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Thorium 228	0.274		0.0753	0.0805		0.0385	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Thorium-232	0.341		0.145	0.149		0.0361	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Thorium-234	0.810		0.544	0.552		0.341	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Uranium-235	-0.135	U	0.151	0.151		0.421	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Uranium-238	0.810		0.544	0.552		0.341	pCi/g	11/20/20 15:32	12/11/20 22:10	1

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Client Sample Results

Page 84 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-008

Lab Sample ID: 160-40340-8

Matrix: Solid

Date Collected: 11/06/20 15:01

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.260		0.153	0.155		0.0612	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Actinium-227	-0.311	U	0.529	0.530		0.375	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Bismuth-212	0.309	U	0.642	0.643		0.500	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Bismuth-214	0.0427	U	0.0725	0.0726		0.172	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Cesium-137	-0.0442	U	0.0775	0.0776	0.0700	0.0611	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Lead-210	0.635	U	1.42	1.42		0.902	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Lead-212	0.366		0.0811	0.0939		0.0411	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Lead-214	0.294		0.0879	0.0930		0.0477	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Potassium-40	8.54		1.25	1.52		0.272	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Protactinium-231	-0.819	U	2.89	2.89		2.35	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Protactinium-234	0.0111	U	0.0181	0.0182		0.157	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Radium-226	0.0427	U	0.0725	0.0726	0.200	0.172	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Radium-228	0.260		0.153	0.155		0.0612	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Thallium-208	0.118		0.0509	0.0523		0.0205	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Thorium 228	0.366		0.0811	0.0939		0.0411	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Thorium-232	0.260		0.153	0.155		0.0612	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Thorium-234	0.579		0.497	0.501		0.311	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Uranium-235	0.000	U	0.0946	0.0946		0.248	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Uranium-238	0.579		0.497	0.501		0.311	pCi/g	11/20/20 15:32	12/11/20 22:12	1

Client Sample ID: HPPG-ESU-TU099A-009

Lab Sample ID: 160-40340-9

Matrix: Solid

Date Collected: 11/06/20 15:05

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.407		0.153	0.159		0.0382	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Actinium-227	0.0157	U	0.562	0.562		0.349	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Bismuth-212	-0.360	U	1.11	1.11		0.748	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Bismuth-214	0.384		0.148	0.153		0.0747	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Cesium-137	-0.0316	U	0.0905	0.0905	0.0700	0.0558	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Lead-210	-0.344	U	1.23	1.23		0.894	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Lead-212	0.370		0.0869	0.0993		0.0386	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Lead-214	0.297		0.113	0.117		0.0780	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Potassium-40	7.17		1.42	1.60		0.260	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Protactinium-231	0.715	U	2.16	2.16		1.74	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Protactinium-234	-0.0830	U	0.207	0.208		0.167	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Radium-226	0.384		0.148	0.153	0.200	0.0747	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Radium-228	0.407		0.153	0.159		0.0382	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Thallium-208	0.140		0.0624	0.0641		0.0237	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Thorium 228	0.370		0.0869	0.0993		0.0386	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Thorium-232	0.407		0.153	0.159		0.0382	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Thorium-234	-0.588	U	0.616	0.620		0.720	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Uranium-235	0.151	U	0.277	0.277		0.235	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Uranium-238	-0.588	U	0.616	0.620		0.720	pCi/g	11/20/20 15:32	12/11/20 22:11	1

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Client Sample Results

Page 85 of 116

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40340-1
 SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-010
Lab Sample ID: 160-40340-10

Date Collected: 11/06/20 15:09

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.255		0.109	0.112		0.0273	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Actinium-227	0.239	U	0.469	0.470		0.280	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Bismuth-212	0.356	U	0.719	0.720		0.560	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Bismuth-214	0.339		0.120	0.125		0.0524	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Cesium-137	-0.0464	U	0.0794	0.0796	0.0700	0.0623	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Lead-210	0.376	U	1.25	1.26		0.856	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Lead-212	0.286		0.0757	0.0814		0.0397	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Lead-214	0.334		0.0975	0.103		0.0498	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Potassium-40	7.87		1.20	1.44		0.106	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Protactinium-231	0.554	U	1.65	1.65		1.81	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Protactinium-234	-0.0957	U	0.297	0.298		0.242	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Radium-226	0.339		0.120	0.125	0.200	0.0524	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Radium-228	0.255		0.109	0.112		0.0273	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Thallium-208	0.0912		0.0642	0.0649		0.0316	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Thorium 228	0.286		0.0757	0.0814		0.0397	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Thorium-232	0.255		0.109	0.112		0.0273	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Thorium-234	0.608		0.500	0.504		0.354	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Uranium-235	0.134	U	0.268	0.268		0.425	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Uranium-238	0.608		0.500	0.504		0.354	pCi/g	11/20/20 15:32	12/11/20 22:34	1

Client Sample ID: HPPG-ESU-TU099A-011
Lab Sample ID: 160-40340-11

Date Collected: 11/06/20 15:12

Matrix: Solid

Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	0.199		0.145	0.146	0.160	0.103	pCi/g	12/16/20 14:29	01/04/21 13:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	98.8		40 - 110					12/16/20 14:29	01/04/21 13:53	1
Y Carrier	91.2		40 - 110					12/16/20 14:29	01/04/21 13:53	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.380		0.105	0.112		0.0427	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Actinium-227	0.165	U	0.257	0.258		0.219	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Bismuth-212	0.242	U	0.478	0.478		0.370	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Bismuth-214	0.331		0.103	0.109		0.0449	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Cesium-137	0.0126	U	0.0277	0.0277	0.0700	0.0210	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Lead-210	-0.162	U	1.17	1.17		0.955	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Lead-212	0.330		0.0690	0.0811		0.0354	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Lead-214	0.292		0.0771	0.0829		0.0424	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Potassium-40	8.38		1.07	1.37		0.0794	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Protactinium-231	-0.695	U	2.14	2.14		1.74	pCi/g	11/20/20 15:32	12/11/20 22:35	1

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Client Sample Results

Page 86 of 116

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40340-1
 SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-011
Lab Sample ID: 160-40340-11

Matrix: Solid

 Date Collected: 11/06/20 15:12
 Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Protactinium-234	0.0354	U	0.0676	0.0677		0.185	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Radium-226	0.331		0.103	0.109	0.200	0.0449	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Radium-228	0.380		0.105	0.112		0.0427	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Thallium-208	0.130		0.0395	0.0418		0.0102	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Thorium 228	0.330		0.0690	0.0811		0.0354	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Thorium-232	0.380		0.105	0.112		0.0427	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Thorium-234	0.122	U	0.659	0.659		0.850	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Uranium-235	0.181	U	0.312	0.312		0.298	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Uranium-238	0.122	U	0.659	0.659		0.850	pCi/g	11/20/20 15:32	12/11/20 22:35	1

Client Sample ID: HPPG-ESU-TU099A-012
Lab Sample ID: 160-40340-12

Matrix: Solid

 Date Collected: 11/06/20 15:16
 Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.351		0.123	0.128		0.0445	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Actinium-227	0.112	U	0.412	0.412		0.250	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Bismuth-212	-0.430	U	0.716	0.717		0.554	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Bismuth-214	0.249		0.0983	0.102		0.0487	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Cesium-137	0.0243	U	0.0477	0.0478	0.0700	0.0368	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Lead-210	0.0115	U	1.26	1.26		1.03	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Lead-212	0.215		0.0714	0.0767		0.0428	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Lead-214	0.247		0.0982	0.102		0.0540	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Potassium-40	6.52		1.09	1.27		0.232	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Protactinium-231	0.315	U	1.22	1.23		1.92	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Protactinium-234	-0.0906	U	0.0677	0.0684		0.233	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Radium-226	0.249		0.0983	0.102	0.200	0.0487	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Radium-228	0.351		0.123	0.128		0.0445	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Thallium-208	0.138		0.0480	0.0501		0.0180	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Thorium 228	0.215		0.0714	0.0767		0.0428	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Thorium-232	0.351		0.123	0.128		0.0445	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Thorium-234	-0.599	U	0.853	0.856		0.718	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Uranium-235	-0.161	U	0.552	0.552		0.451	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Uranium-238	-0.599	U	0.853	0.856		0.718	pCi/g	11/20/20 15:32	12/11/20 22:38	1

Client Sample ID: HPPG-ESU-TU099A-013
Lab Sample ID: 160-40340-13

Matrix: Solid

 Date Collected: 11/06/20 15:20
 Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.654		0.197	0.211		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Actinium-227	-0.424	U	0.659	0.661		0.476	pCi/g	11/20/20 15:32	12/11/20 22:39	1

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Client Sample Results

Page 87 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-013**Lab Sample ID: 160-40340-13**

Date Collected: 11/06/20 15:20

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-212	0.252	U	0.826	0.826		0.655	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Bismuth-214	0.414		0.149	0.157		0.0739	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Cesium-137	0.0270	U	0.0645	0.0645	0.0700	0.0503	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Lead-210	-0.900	U	1.94	1.94		1.63	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Lead-212	0.509		0.101	0.117		0.0438	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Lead-214	0.518		0.114	0.129		0.0549	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Potassium-40	7.71		1.39	1.65		0.306	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Protactinium-231	0.391	U	1.23	1.23		1.96	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Protactinium-234	0.0761	U	0.325	0.326		0.266	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Radium-226	0.414		0.149	0.157	0.200	0.0739	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Radium-228	0.654		0.197	0.211		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Thallium-208	0.149		0.0808	0.0826		0.0394	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Thorium 228	0.509		0.101	0.117		0.0438	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Thorium-232	0.654		0.197	0.211		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Thorium-234	0.235	U	0.595	0.596		0.472	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Uranium-235	0.0895	U	0.191	0.191		0.459	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Uranium-238	0.235	U	0.595	0.596		0.472	pCi/g	11/20/20 15:32	12/11/20 22:39	1

Client Sample ID: HPPG-ESU-TU099A-014**Lab Sample ID: 160-40340-14**

Date Collected: 11/06/20 15:24

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.177		0.205	0.206		0.157	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Actinium-227	0.161	U	0.454	0.454		0.274	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Bismuth-212	0.311	U	0.649	0.649		0.498	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Bismuth-214	0.359		0.122	0.127		0.0463	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Cesium-137	0.0246	U	0.0503	0.0503	0.0700	0.0384	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Lead-210	1.53		1.45	1.46		0.885	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Lead-212	0.336		0.0747	0.0825		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Lead-214	0.338		0.0847	0.0914		0.0410	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Potassium-40	8.17		1.63	1.83		0.480	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Protactinium-231	0.000	U	0.680	0.680		1.83	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Protactinium-234	0.130	U	0.254	0.254		0.178	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Radium-226	0.359		0.122	0.127	0.200	0.0463	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Radium-228	0.177		0.205	0.206		0.157	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Thallium-208	0.102		0.0720	0.0727		0.0354	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Thorium 228	0.336		0.0747	0.0825		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Thorium-232	0.177		0.205	0.206		0.157	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Thorium-234	-0.876	U	0.558	0.567		0.682	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Uranium-235	0.0681	U	0.195	0.195		0.301	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Uranium-238	-0.876	U	0.558	0.567		0.682	pCi/g	11/20/20 15:32	12/11/20 22:45	1

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Client Sample Results

Page 88 of 116

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40340-1
 SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-015
Lab Sample ID: 160-40340-15

Date Collected: 11/06/20 15:27

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.346		0.106	0.112		0.0229	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Actinium-227	-0.278	U	0.429	0.430		0.335	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Bismuth-212	-0.0469	U	0.755	0.755		0.614	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Bismuth-214	0.126		0.0726	0.0738		0.0961	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Cesium-137	0.0198	U	0.0437	0.0437	0.0700	0.0339	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Lead-210	0.257	U	1.08	1.08		0.733	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Lead-212	0.224		0.0657	0.0718		0.0369	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Lead-214	0.232		0.0774	0.0810		0.0618	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Potassium-40	6.26		1.03	1.21		0.249	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Protactinium-231	0.529	U	1.84	1.84		1.50	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Protactinium-234	-0.0726	U	0.182	0.182		0.147	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Radium-226	0.126		0.0726	0.0738	0.200	0.0961	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Radium-228	0.346		0.106	0.112		0.0229	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Thallium-208	0.0608		0.0615	0.0618		0.0313	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Thorium 228	0.224		0.0657	0.0718		0.0369	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Thorium-232	0.346		0.106	0.112		0.0229	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Thorium-234	-0.523	U	0.452	0.456		0.421	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Uranium-235	-0.117	U	0.295	0.296		0.239	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Uranium-238	-0.523	U	0.452	0.456		0.421	pCi/g	11/20/20 15:32	12/11/20 22:47	1

Client Sample ID: HPPG-ESU-TU099A-016
Lab Sample ID: 160-40340-16

Date Collected: 11/06/20 15:30

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.219		0.122	0.124		0.0404	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Actinium-227	0.0992	U	0.422	0.422		0.334	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Bismuth-212	0.0233	U	0.762	0.762		0.624	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Bismuth-214	0.380		0.136	0.142		0.0709	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Cesium-137	0.0114	U	0.0599	0.0599	0.0700	0.0477	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Lead-210	-0.151	U	1.32	1.32		0.945	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Lead-212	0.377		0.0923	0.104		0.0432	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Lead-214	0.399		0.131	0.137		0.0644	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Potassium-40	8.42		1.57	1.80		0.275	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Protactinium-231	0.000	U	0.197	0.197		2.03	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Protactinium-234	-0.0276	U	0.0715	0.0715		0.162	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Radium-226	0.380		0.136	0.142	0.200	0.0709	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Radium-228	0.219		0.122	0.124		0.0404	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Thallium-208	0.107		0.0759	0.0767		0.0310	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Thorium 228	0.377		0.0923	0.104		0.0432	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Thorium-232	0.219		0.122	0.124		0.0404	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Thorium-234	0.680		0.616	0.620		0.367	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Uranium-235	0.145	U	0.271	0.272		0.222	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Uranium-238	0.680		0.616	0.620		0.367	pCi/g	11/20/20 15:32	12/11/20 22:46	1

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Client Sample Results

Page 89 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-017

Lab Sample ID: 160-40340-17

Matrix: Solid

Date Collected: 11/06/20 15:32

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.403		0.171	0.176		0.0830	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Actinium-227	0.125	U	0.251	0.251		0.284	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Bismuth-212	-0.113	U	1.04	1.04		0.850	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Bismuth-214	0.320		0.138	0.142		0.0622	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Cesium-137	-0.0547	U	0.0860	0.0862	0.0700	0.0668	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Lead-210	-1.66	U	1.16	1.17		1.55	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Lead-212	0.350		0.0895	0.100		0.0474	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Lead-214	0.322		0.125	0.129		0.0595	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Potassium-40	8.08		1.42	1.65		0.256	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Protactinium-231	0.000	U	0.630	0.630		2.15	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Protactinium-234	0.174	U	0.117	0.119		0.235	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Radium-226	0.320		0.138	0.142	0.200	0.0622	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Radium-228	0.403		0.171	0.176		0.0830	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Thallium-208	0.191		0.0635	0.0666		0.0228	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Thorium 228	0.350		0.0895	0.100		0.0474	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Thorium-232	0.403		0.171	0.176		0.0830	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Thorium-234	-0.828	U	0.802	0.808		1.02	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Uranium-235	0.0854	U	0.214	0.214		0.272	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Uranium-238	-0.828	U	0.802	0.808		1.02	pCi/g	11/20/20 15:32	12/11/20 22:41	1

Client Sample ID: HPPG-ESU-TU099A-018

Lab Sample ID: 160-40340-18

Matrix: Solid

Date Collected: 11/06/20 15:34

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.358		0.172	0.175		0.0676	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Actinium-227	-0.246	U	0.327	0.328		0.316	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Bismuth-212	-0.00287	U	0.562	0.562		0.462	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Bismuth-214	0.465		0.111	0.121		0.0392	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Cesium-137	0.0186	U	0.0365	0.0365	0.0700	0.0279	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Lead-210	0.465	U	1.01	1.02		0.809	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Lead-212	0.354		0.0666	0.0809		0.0276	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Lead-214	0.345		0.0918	0.0985		0.0467	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Potassium-40	7.15		1.06	1.29		0.240	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-231	0.000	U	0.369	0.369		1.66	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-234	0.151	U	0.0839	0.0853		0.153	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Radium-226	0.465		0.111	0.121	0.200	0.0392	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Radium-228	0.358		0.172	0.175		0.0676	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thallium-208	0.0936		0.0511	0.0520		0.0211	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thorium 228	0.354		0.0666	0.0809		0.0276	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thorium-232	0.358		0.172	0.175		0.0676	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thorium-234	0.206	U	0.585	0.586		0.507	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Uranium-235	-0.158	U	0.444	0.444		0.362	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Uranium-238	0.206	U	0.585	0.586		0.507	pCi/g	11/20/20 15:32	12/11/20 23:20	1

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Client Sample Results

Page 90 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-019

Lab Sample ID: 160-40340-19

Matrix: Solid

Date Collected: 11/06/20 15:35

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.314		0.178	0.181		0.0940	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Actinium-227	0.129	U	0.401	0.401		0.318	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Bismuth-212	-0.194	U	0.772	0.772		0.618	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Bismuth-214	0.463		0.148	0.155		0.0629	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Cesium-137	0.0252	U	0.0457	0.0458	0.0700	0.0344	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Lead-210	1.24		1.26	1.27		0.827	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Lead-212	0.347		0.0863	0.0936		0.0449	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Lead-214	0.429		0.105	0.114		0.0487	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Potassium-40	8.11		1.27	1.51		0.115	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-231	-0.915	U	3.02	3.03		2.46	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-234	0.0274	U	0.282	0.282		0.232	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Radium-226	0.463		0.148	0.155	0.200	0.0629	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Radium-228	0.314		0.178	0.181		0.0940	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thallium-208	0.197		0.0505	0.0544		0.00737	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thorium 228	0.347		0.0863	0.0936		0.0449	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thorium-232	0.314		0.178	0.181		0.0940	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thorium-234	1.03		0.709	0.718		0.407	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Uranium-235	0.297		0.244	0.246		0.135	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Uranium-238	1.03		0.709	0.718		0.407	pCi/g	11/20/20 15:32	12/11/20 23:20	1

Client Sample ID: HPPG-ESU-TU099A-020

Lab Sample ID: 160-40340-20

Matrix: Solid

Date Collected: 11/06/20 15:36

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.423		0.179	0.184		0.0677	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Actinium-227	0.162	U	0.365	0.365		0.272	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Bismuth-212	0.291	U	0.469	0.470		0.355	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Bismuth-214	0.292		0.0877	0.0928		0.0377	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Cesium-137	0.0232	U	0.0417	0.0417	0.0700	0.0320	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-210	0.571	U	1.24	1.24		0.994	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-212	0.351		0.0730	0.0859		0.0372	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-214	0.369		0.0861	0.0942		0.0526	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Potassium-40	7.66		1.05	1.31		0.0845	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-231	0.000	U	0.507	0.507		1.65	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-234	-0.00537	U	0.208	0.208		0.171	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Radium-226	0.292		0.0877	0.0928	0.200	0.0377	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Radium-228	0.423		0.179	0.184		0.0677	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thallium-208	0.144		0.0360	0.0389		0.00524	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium 228	0.351		0.0730	0.0859		0.0372	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium-232	0.423		0.179	0.184		0.0677	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium-234	0.309	U	0.764	0.765		0.855	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-235	0.0730	U	0.172	0.172		0.281	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-238	0.309	U	0.764	0.765		0.855	pCi/g	11/20/20 15:32	12/11/20 23:23	1

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Client Sample Results

Page 91 of 116

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40340-1
 SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-021
Lab Sample ID: 160-40340-21

Date Collected: 11/06/20 15:39

Matrix: Solid

Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.0198	U	0.145	0.145	0.160	0.121	pCi/g	12/16/20 14:29	01/04/21 13:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	100		40 - 110					12/16/20 14:29	01/04/21 13:53	1
Y Carrier	90.8		40 - 110					12/16/20 14:29	01/04/21 13:53	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.137	U	0.255	0.255		0.160	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Actinium-227	0.213	U	0.433	0.433		0.295	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Bismuth-212	0.0713	U	0.674	0.674		0.548	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Bismuth-214	0.350		0.104	0.110		0.0403	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Cesium-137	-0.0429	U	0.0660	0.0661	0.0700	0.0504	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-210	-1.46	U	1.41	1.42		1.31	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-212	0.298		0.0966	0.104		0.0473	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-214	0.325		0.125	0.130		0.0798	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Potassium-40	7.94		1.36	1.58		0.237	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-231	0.277	U	1.23	1.23		1.91	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-234	0.121	U	0.276	0.276		0.178	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Radium-226	0.350		0.104	0.110	0.200	0.0403	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Radium-228	0.137	U	0.255	0.255		0.160	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thallium-208	0.0931		0.0403	0.0415		0.0148	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium 228	0.298		0.0966	0.104		0.0473	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium-232	0.137	U	0.255	0.255		0.160	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium-234	-0.430	U	0.643	0.645		0.910	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-235	0.139	U	0.379	0.379		0.350	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-238	-0.430	U	0.643	0.645		0.910	pCi/g	11/20/20 15:32	12/11/20 23:23	1

Client Sample ID: HPPG-ESU-TU099A-022
Lab Sample ID: 160-40340-22

Date Collected: 11/06/20 15:36

Matrix: Solid

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.416		0.154	0.160		0.0334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Actinium-227	0.152	U	0.419	0.420		0.334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Bismuth-212	0.235	U	0.698	0.698		0.549	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Bismuth-214	0.0422	U	0.137	0.137		0.180	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Cesium-137	0.0324	U	0.0611	0.0612	0.0700	0.0469	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Lead-210	1.07		1.59	1.60		1.04	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Lead-212	0.342		0.109	0.118		0.0681	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Lead-214	0.427		0.135	0.143		0.0696	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Potassium-40	9.21		1.49	1.76		0.310	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Protactinium-231	0.705	U	2.17	2.17		2.37	pCi/g	11/20/20 15:32	12/11/20 23:24	1

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Client Sample Results

Page 92 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-022

Lab Sample ID: 160-40340-22

Matrix: Solid

Date Collected: 11/06/20 15:36

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0356	U	0.0593	0.0594		0.277	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Radium-226	0.0422	U	0.137	0.137	0.200	0.180	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Radium-228	0.416		0.154	0.160		0.0334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thallium-208	0.174		0.0601	0.0627		0.0229	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium 228	0.342		0.109	0.118		0.0681	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium-232	0.416		0.154	0.160		0.0334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium-234	-0.426	U	1.03	1.03		0.858	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-235	0.109	U	0.229	0.229		0.343	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-238	-0.426	U	1.03	1.03		0.858	pCi/g	11/20/20 15:32	12/11/20 23:24	1

Client Sample ID: HPPG-ESU-TU099A-023

Lab Sample ID: 160-40340-23

Matrix: Solid

Date Collected: 11/06/20 15:40

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.459		0.160	0.168		0.0324	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Actinium-227	0.0975	U	0.397	0.397		0.389	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Bismuth-212	-0.249	U	0.924	0.925		0.741	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Bismuth-214	0.332		0.141	0.146		0.0566	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Cesium-137	-0.0448	U	0.0754	0.0756	0.0700	0.0584	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Lead-210	0.525	U	1.37	1.37		0.967	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Lead-212	0.368		0.0919	0.102		0.0486	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Lead-214	0.397		0.120	0.129		0.0542	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Potassium-40	8.25		1.38	1.68		0.286	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Protactinium-231	0.000	U	0.240	0.240		2.33	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Protactinium-234	0.00764	U	0.0137	0.0137		0.272	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Radium-226	0.332		0.141	0.146	0.200	0.0566	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Radium-228	0.459		0.160	0.168		0.0324	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thallium-208	0.0873		0.0897	0.0902		0.0468	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium 228	0.368		0.0919	0.102		0.0486	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium-232	0.459		0.160	0.168		0.0324	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium-234	-0.0831	U	1.14	1.14		0.941	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-235	-0.225	U	0.108	0.111		0.526	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-238	-0.0831	U	1.14	1.14		0.941	pCi/g	11/20/20 15:32	12/11/20 23:24	1

Client Sample ID: HPPG-ESU-TU099A-024

Lab Sample ID: 160-40340-24

Matrix: Solid

Date Collected: 11/06/20 15:41

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.439		0.162	0.168		0.0797	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Actinium-227	0.0591	U	0.215	0.215		0.255	pCi/g	11/20/20 15:32	12/14/20 21:03	1

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Client Sample Results

Page 93 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-ESU-TU099A-024

Lab Sample ID: 160-40340-24

Matrix: Solid

Date Collected: 11/06/20 15:41

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-212	-0.109	U	0.541	0.541		0.430	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Bismuth-214	0.403		0.103	0.111		0.0388	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Cesium-137	0.0145	U	0.0431	0.0432	0.0700	0.0342	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Lead-210	0.460	U	1.02	1.03		0.818	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Lead-212	0.428		0.0721	0.0909		0.0302	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Lead-214	0.405		0.100	0.109		0.0396	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Potassium-40	8.10		1.10	1.38		0.231	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Protactinium-231	0.275	U	1.01	1.01		1.60	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Protactinium-234	-0.0834	U	0.238	0.238		0.194	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Radium-226	0.403		0.103	0.111	0.200	0.0388	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Radium-228	0.439		0.162	0.168		0.0797	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Thallium-208	0.0708		0.0487	0.0492		0.0239	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Thorium 228	0.428		0.0721	0.0909		0.0302	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Thorium-232	0.439		0.162	0.168		0.0797	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Thorium-234	0.0863	U	0.430	0.430		0.693	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Uranium-235	0.0597	U	0.187	0.187		0.349	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Uranium-238	0.0863	U	0.430	0.430		0.693	pCi/g	11/20/20 15:32	12/14/20 21:03	1

Client Sample ID: HPPG-ESU-TU099A-025

Lab Sample ID: 160-40340-25

Matrix: Solid

Date Collected: 11/06/20 15:43

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.657		0.170	0.183		0.0875	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Actinium-227	0.102	U	0.403	0.403		0.321	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Bismuth-212	0.442	U	0.945	0.946		0.747	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Bismuth-214	0.465		0.152	0.159		0.0635	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Cesium-137	0.00108	U	0.0500	0.0500	0.0700	0.0411	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Lead-210	0.900	U	1.52	1.53		1.20	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Lead-212	0.419		0.0964	0.111		0.0525	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Lead-214	0.416		0.106	0.115		0.0604	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Potassium-40	9.42		1.37	1.68		0.262	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Protactinium-231	0.000	U	0.950	0.950		2.21	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Protactinium-234	0.0743	U	0.240	0.240		0.211	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Radium-226	0.465		0.152	0.159	0.200	0.0635	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Radium-228	0.657		0.170	0.183		0.0875	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Thallium-208	0.191		0.0649	0.0679		0.0246	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Thorium 228	0.419		0.0964	0.111		0.0525	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Thorium-232	0.657		0.170	0.183		0.0875	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Thorium-234	-0.628	U	0.989	0.992		0.830	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Uranium-235	0.0846	U	0.315	0.315		0.270	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Uranium-238	-0.628	U	0.989	0.992		0.830	pCi/g	11/20/20 16:22	12/11/20 11:17	1

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Client Sample Results

Page 94 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-F-029

Date Collected: 11/06/20 14:34

Date Received: 11/11/20 09:05

Lab Sample ID: 160-40340-26

Matrix: Solid

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.0272	U	0.160	0.160	0.160	0.134	pCi/g	12/16/20 14:29	01/04/21 13:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	95.5		40 - 110					12/16/20 14:29	01/04/21 13:53	1
Y Carrier	88.2		40 - 110					12/16/20 14:29	01/04/21 13:53	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.128		0.152	0.152		0.105	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Actinium-227	0.0457	U	0.510	0.510		0.315	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Bismuth-212	-0.402	U	0.996	0.997		0.788	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Bismuth-214	0.369		0.126	0.131		0.0482	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Cesium-137	0.0184	U	0.0497	0.0498	0.0700	0.0386	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Lead-210	1.54		1.80	1.81		1.41	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Lead-212	0.310		0.0729	0.0798		0.0328	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Lead-214	0.303		0.0930	0.0980		0.0402	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Potassium-40	8.07		1.42	1.64		0.209	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Protactinium-231	0.490	U	1.53	1.53		1.61	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Protactinium-234	0.120	U	0.231	0.231		0.151	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Radium-226	0.369		0.126	0.131	0.200	0.0482	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Radium-228	0.128		0.152	0.152		0.105	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thallium-208	0.110		0.0429	0.0443		0.0118	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium 228	0.310		0.0729	0.0798		0.0328	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium-232	0.128		0.152	0.152		0.105	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium-234	-0.0328	U	0.0692	0.0693		0.650	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-235	-0.0335	U	0.417	0.417		0.311	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-238	-0.0328	U	0.0692	0.0693		0.650	pCi/g	11/20/20 16:22	12/11/20 11:19	1

Client Sample ID: HPPG-F-030

Date Collected: 11/06/20 14:57

Date Received: 11/11/20 09:05

Lab Sample ID: 160-40340-27

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.399		0.150	0.156		0.0824	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Actinium-227	-0.326	U	0.697	0.698		0.420	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Bismuth-212	0.360	U	0.778	0.779		0.599	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Bismuth-214	0.225		0.150	0.152		0.0783	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Cesium-137	-0.0288	U	0.0490	0.0491	0.0700	0.0702	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Lead-210	-0.154	U	1.27	1.27		0.913	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Lead-212	0.224		0.0769	0.0822		0.0425	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Lead-214	0.249		0.108	0.111		0.0599	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Potassium-40	6.56		1.36	1.51		0.260	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Protactinium-231	0.000	U	0.588	0.588		1.65	pCi/g	11/20/20 16:22	12/11/20 11:19	1

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Client Sample Results

Page 95 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Client Sample ID: HPPG-F-030

Lab Sample ID: 160-40340-27

Matrix: Solid

Date Collected: 11/06/20 14:57

Date Received: 11/11/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Protactinium-234	0.337		0.165	0.168		0.157	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Radium-226	0.225		0.150	0.152	0.200	0.0783	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Radium-228	0.399		0.150	0.156		0.0824	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thallium-208	0.0969		0.0435	0.0447		0.0145	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium 228	0.224		0.0769	0.0822		0.0425	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium-232	0.399		0.150	0.156		0.0824	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium-234	0.307 U		0.412	0.413		0.313	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-235	-0.140 U		0.222	0.222		0.248	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-238	0.307 U		0.412	0.413		0.313	pCi/g	11/20/20 16:22	12/11/20 11:19	1

QC Sample Results

Page 96 of 116

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40340-1
 SDG: GJ46599773

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-492111/22-A
Matrix: Solid
Analysis Batch: 493835
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 492111

Analyte	MB	MB	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.						
Strontium-90	-0.03798	U		0.125	0.125	0.160	0.106	pCi/g	12/16/20 14:29	01/04/21 13:58	1
Carrier											
Sr Carrier	96.8	%Yield	MB	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Y Carrier	94.6				40 - 110				12/16/20 14:29	01/04/21 13:58	1

Lab Sample ID: LCS 160-492111/1-A
Matrix: Solid
Analysis Batch: 493723
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 492111

Analyte	MB	MB	Qualifier	Spike Added	LCS	LCS	Total Uncert.	LOQ	DLC	Unit	%Rec.
	Result	Uncert.			(2σ+/-)	Qual					
Strontium-90				7.75	6.756	6.756	0.712	0.160	0.115	pCi/g	87
Carrier											
Sr Carrier	102	%Yield	MB	Qualifier	Limits						
Y Carrier	94.6				40 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-489844/1-A
Matrix: Solid
Analysis Batch: 491443
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 489844

Analyte	MB	MB	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.						
Actinium 228	0.04908	U		0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Actinium-227	0.06310	U		0.159	0.159		0.330	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-212	0.0000	U		0.133	0.133		0.335	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-214	-0.008210	U		0.114	0.114		0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Cesium-137	0.007259	U		0.0689	0.0689	0.0700	0.0558	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-210	1.261			1.60	1.61		1.05	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-212	0.01003	U		0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-214	0.03327	U		0.0785	0.0786		0.0761	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Potassium-40	-0.5926	U		0.723	0.726		0.723	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-231	0.3075	U		0.995	0.995		0.778	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-234	0.03644	U		0.0817	0.0817		0.166	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-226	-0.008210	U		0.114	0.114	0.200	0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-228	0.04908	U		0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thallium-208	0.04141			0.0370	0.0373		0.0238	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium 228	0.01003	U		0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-232	0.04908	U		0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-234	-1.112	U		0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-235	-0.04770	U		0.334	0.334		0.304	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-238	-1.112	U		0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1

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QC Sample Results

Page 97 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-489844/2-A

Matrix: Solid

Analysis Batch: 491441

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 489844

Analyte	Spike Added	Total				%Rec.	Limits		
		LCS Result	LCS Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Americium-241	96.4	97.37		10.2		0.588	pCi/g	101	87 - 116
Cesium-137	26.7	26.30		2.84	0.0700	0.0907	pCi/g	98	87 - 120
Cobalt-60	9.47	9.183		0.997		0.0186	pCi/g	97	87 - 115

Lab Sample ID: 160-40340-4 DU

Matrix: Solid

Analysis Batch: 491439

Client Sample ID: HPPG-ESU-TU099A-004

Prep Type: Total/NA

Prep Batch: 489844

Analyte	Sample		DU		Total		RER	Limit		
	Result	Qual	Result	Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Actinium 228	0.345		0.6218		0.204		0.0908	pCi/g	0.67	1
Actinium-227	0.0809	U	0.1662	U	0.472		0.365	pCi/g	0.14	1
Bismuth-212	-0.444	U	-0.02517	U	0.790		0.648	pCi/g	0.32	1
Bismuth-214	0.472		0.3936		0.148		0.0657	pCi/g	0.29	1
Cesium-137	0.0200	U	0.03126	U	0.0780	0.0700	0.0614	pCi/g	0.09	1
Lead-210	0.574	U	1.418		1.52		1.16	pCi/g	0.30	1
Lead-212	0.371		0.2969		0.114		0.0698	pCi/g	0.37	1
Lead-214	0.379		0.4735		0.125		0.0551	pCi/g	0.41	1
Potassium-40	8.77		8.582		1.77		0.280	pCi/g	0.06	1
Protactinium-231	0.000	U	0.7288	U	2.58		2.09	pCi/g	0.24	1
Protactinium-234	0.0736	U	-0.00389	U	0.00595		0.283	pCi/g	0.45	1
Radium-226	0.472		0.3936		0.148	0.200	0.0657	pCi/g	0.29	1
Radium-228	0.345		0.6218		0.204		0.0908	pCi/g	0.67	1
Thallium-208	0.128		0.2152		0.0641		0.0174	pCi/g	0.82	1
Thorium 228	0.371		0.2969		0.114		0.0698	pCi/g	0.37	1
Thorium-232	0.345		0.6218		0.204		0.0908	pCi/g	0.67	1
Thorium-234	0.501		-0.2045	U	1.34		1.11	pCi/g	0.42	1
Uranium-235	0.0135	U	0.06258	U	0.281		0.526	pCi/g	0.12	1
Uranium-238	0.501		-0.2045	U	1.34		1.11	pCi/g	0.42	1

Lab Sample ID: MB 160-489851/1-A

Matrix: Solid

Analysis Batch: 491606

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 489851

Analyte	MB		Count		Total		Prepared	Analyzed	Dil Fac
	Result	MB Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Actinium 228	-0.1227	U	0.313	0.313		0.158	pCi/g	11/20/20 15:32	12/11/20 21:59
Actinium-227	0.08274	U	0.201	0.202		0.309	pCi/g	11/20/20 15:32	12/11/20 21:59
Bismuth-212	0.0000	U	0.114	0.114		0.666	pCi/g	11/20/20 15:32	12/11/20 21:59
Bismuth-214	-0.02362	U	0.184	0.184		0.152	pCi/g	11/20/20 15:32	12/11/20 21:59
Cesium-137	-0.003155	U	0.0568	0.0568	0.0700	0.0463	pCi/g	11/20/20 15:32	12/11/20 21:59
Lead-210	1.156		1.59	1.60		1.07	pCi/g	11/20/20 15:32	12/11/20 21:59
Lead-212	0.0000164	U	0.101	0.101		0.0829	pCi/g	11/20/20 15:32	12/11/20 21:59
Lead-214	-0.04248	U	0.144	0.144		0.121	pCi/g	11/20/20 15:32	12/11/20 21:59
Potassium-40	-0.1359	U	0.827	0.827		0.388	pCi/g	11/20/20 15:32	12/11/20 21:59
Protactinium-231	0.0000001	U	2.93	2.93		2.41	pCi/g	11/20/20 15:32	12/11/20 21:59

QC Sample Results

Page 98 of 116

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40340-1
 SDG: GJ46599773

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-489851/1-A
Matrix: Solid
Analysis Batch: 491606
Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 489851

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Protactinium-234	0.09106	U		0.242	0.242			0.200	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Radium-226	-0.02362	U		0.184	0.184	0.200		0.152	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Radium-228	-0.1227	U		0.313	0.313			0.158	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Thallium-208	0.004349	U		0.0646	0.0646			0.0365	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Thorium 228	0.0000164	U		0.101	0.101			0.0829	pCi/g	11/20/20 15:32	12/11/20 21:59	1
	7											
Thorium-232	-0.1227	U		0.313	0.313			0.158	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Thorium-234	-0.4208	U		0.927	0.928			0.779	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Uranium-235	-0.1593	U		0.461	0.462			0.372	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Uranium-238	-0.4208	U		0.927	0.928			0.779	pCi/g	11/20/20 15:32	12/11/20 21:59	1

Lab Sample ID: LCS 160-489851/2-A
Matrix: Solid
Analysis Batch: 491435
Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 489851

Analyte	Spike Added	LCS Result	LCS Qual	Total		DLC	Unit	%Rec	Limits	%Rec.	Limits
				Uncert.	(2σ+/-)						
Americium-241	96.4	88.42		9.29		0.506	pCi/g	92	87 - 116		
Cesium-137	26.7	25.07		2.67	0.0700	0.0792	pCi/g	94	87 - 120		
Cobalt-60	9.47	8.743		0.919		0.00931	pCi/g	92	87 - 115		

Lab Sample ID: 160-40340-24 DU
Matrix: Solid
Analysis Batch: 491646
Client Sample ID: HPPG-ESU-TU099A-024
Prep Type: Total/NA
Prep Batch: 489851

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total		DLC	Unit	RER	Limit
					Uncert.	(2σ+/-)				
Actinium 228	0.439		0.4778		0.118		0.0197	pCi/g	0.13	1
Actinium-227	0.0591	U	0.1847	U	0.358		0.204	pCi/g	0.22	1
Bismuth-212	-0.109	U	0.0000	U	0.378		0.493	pCi/g	0.12	1
Bismuth-214	0.403		0.2733		0.0960		0.0435	pCi/g	0.63	1
Cesium-137	0.0145	U	0.01877	U	0.0436	0.0700	0.0343	pCi/g	0.05	1
Lead-210	0.460	U	0.5001	U	0.986		0.784	pCi/g	0.02	1
Lead-212	0.428		0.3142		0.0749		0.0290	pCi/g	0.69	1
Lead-214	0.405		0.3300		0.0877		0.0401	pCi/g	0.38	1
Potassium-40	8.10		7.837		1.30		0.0777	pCi/g	0.1	1
Protactinium-231	0.275	U	0.0000	U	0.239		1.58	pCi/g	0.22	1
Protactinium-234	-0.0834	U	-0.08818	U	0.247		0.201	pCi/g	0.01	1
Radium-226	0.403		0.2733		0.0960	0.200	0.0435	pCi/g	0.63	1
Radium-228	0.439		0.4778		0.118		0.0197	pCi/g	0.13	1
Thallium-208	0.0708		0.1260		0.0348		0.00481	pCi/g	0.66	1
Thorium 228	0.428		0.3142		0.0749		0.0290	pCi/g	0.69	1
Thorium-232	0.439		0.4778		0.118		0.0197	pCi/g	0.13	1
Thorium-234	0.0863	U	0.000173	U	0.000324		0.713	pCi/g	0.20	1
			0							
Uranium-235	0.0597	U	-0.1527	U	0.437		0.356	pCi/g	0.34	1
Uranium-238	0.0863	U	0.000173	U	0.000324	0	0.713	pCi/g	0.20	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Page 99 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-489908/2-A

Matrix: Solid

Analysis Batch: 491438

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 489908

Analyte	Spike Added	LCS		Total		LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)						
Americium-241	96.4	98.60		12.8		0.0700	0.643	pCi/g	102	87 - 116
Cesium-137	26.7	29.83		3.54			0.135	pCi/g	112	87 - 120
Cobalt-60	9.47	10.16		1.22			0.0830	pCi/g	107	87 - 115

QC Association Summary

Page 100 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Rad

Leach Batch: 489016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-1	HPPG-ESU-TU099A-001	Total/NA	Solid	Dry and Grind	
160-40340-2	HPPG-ESU-TU099A-002	Total/NA	Solid	Dry and Grind	
160-40340-3	HPPG-ESU-TU099A-003	Total/NA	Solid	Dry and Grind	
160-40340-4	HPPG-ESU-TU099A-004	Total/NA	Solid	Dry and Grind	
160-40340-5	HPPG-ESU-TU099A-005	Total/NA	Solid	Dry and Grind	
160-40340-6	HPPG-ESU-TU099A-006	Total/NA	Solid	Dry and Grind	
160-40340-7	HPPG-ESU-TU099A-007	Total/NA	Solid	Dry and Grind	
160-40340-8	HPPG-ESU-TU099A-008	Total/NA	Solid	Dry and Grind	
160-40340-9	HPPG-ESU-TU099A-009	Total/NA	Solid	Dry and Grind	
160-40340-10	HPPG-ESU-TU099A-010	Total/NA	Solid	Dry and Grind	
160-40340-11	HPPG-ESU-TU099A-011	Total/NA	Solid	Dry and Grind	
160-40340-12	HPPG-ESU-TU099A-012	Total/NA	Solid	Dry and Grind	
160-40340-13	HPPG-ESU-TU099A-013	Total/NA	Solid	Dry and Grind	
160-40340-14	HPPG-ESU-TU099A-014	Total/NA	Solid	Dry and Grind	
160-40340-4 DU	HPPG-ESU-TU099A-004	Total/NA	Solid	Dry and Grind	

Leach Batch: 489020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-15	HPPG-ESU-TU099A-015	Total/NA	Solid	Dry and Grind	
160-40340-16	HPPG-ESU-TU099A-016	Total/NA	Solid	Dry and Grind	
160-40340-17	HPPG-ESU-TU099A-017	Total/NA	Solid	Dry and Grind	
160-40340-18	HPPG-ESU-TU099A-018	Total/NA	Solid	Dry and Grind	
160-40340-19	HPPG-ESU-TU099A-019	Total/NA	Solid	Dry and Grind	
160-40340-20	HPPG-ESU-TU099A-020	Total/NA	Solid	Dry and Grind	
160-40340-21	HPPG-ESU-TU099A-021	Total/NA	Solid	Dry and Grind	
160-40340-22	HPPG-ESU-TU099A-022	Total/NA	Solid	Dry and Grind	
160-40340-23	HPPG-ESU-TU099A-023	Total/NA	Solid	Dry and Grind	
160-40340-24	HPPG-ESU-TU099A-024	Total/NA	Solid	Dry and Grind	
160-40340-25	HPPG-ESU-TU099A-025	Total/NA	Solid	Dry and Grind	
160-40340-26	HPPG-F-029	Total/NA	Solid	Dry and Grind	
160-40340-27	HPPG-F-030	Total/NA	Solid	Dry and Grind	
160-40340-24 DU	HPPG-ESU-TU099A-024	Total/NA	Solid	Dry and Grind	

Prep Batch: 489844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-1	HPPG-ESU-TU099A-001	Total/NA	Solid	Fill_Geo-21	489016
160-40340-2	HPPG-ESU-TU099A-002	Total/NA	Solid	Fill_Geo-21	489016
160-40340-3	HPPG-ESU-TU099A-003	Total/NA	Solid	Fill_Geo-21	489016
160-40340-4	HPPG-ESU-TU099A-004	Total/NA	Solid	Fill_Geo-21	489016
MB 160-489844/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489844/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40340-4 DU	HPPG-ESU-TU099A-004	Total/NA	Solid	Fill_Geo-21	489016

Prep Batch: 489851

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-5	HPPG-ESU-TU099A-005	Total/NA	Solid	Fill_Geo-21	489016
160-40340-6	HPPG-ESU-TU099A-006	Total/NA	Solid	Fill_Geo-21	489016
160-40340-7	HPPG-ESU-TU099A-007	Total/NA	Solid	Fill_Geo-21	489016
160-40340-8	HPPG-ESU-TU099A-008	Total/NA	Solid	Fill_Geo-21	489016
160-40340-9	HPPG-ESU-TU099A-009	Total/NA	Solid	Fill_Geo-21	489016
160-40340-10	HPPG-ESU-TU099A-010	Total/NA	Solid	Fill_Geo-21	489016

Eurofins TestAmerica, St. Louis

QC Association Summary

Page 101 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Rad (Continued)

Prep Batch: 489851 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-11	HPPG-ESU-TU099A-011	Total/NA	Solid	Fill_Geo-21	489016
160-40340-12	HPPG-ESU-TU099A-012	Total/NA	Solid	Fill_Geo-21	489016
160-40340-13	HPPG-ESU-TU099A-013	Total/NA	Solid	Fill_Geo-21	489016
160-40340-14	HPPG-ESU-TU099A-014	Total/NA	Solid	Fill_Geo-21	489016
160-40340-15	HPPG-ESU-TU099A-015	Total/NA	Solid	Fill_Geo-21	489020
160-40340-16	HPPG-ESU-TU099A-016	Total/NA	Solid	Fill_Geo-21	489020
160-40340-17	HPPG-ESU-TU099A-017	Total/NA	Solid	Fill_Geo-21	489020
160-40340-18	HPPG-ESU-TU099A-018	Total/NA	Solid	Fill_Geo-21	489020
160-40340-19	HPPG-ESU-TU099A-019	Total/NA	Solid	Fill_Geo-21	489020
160-40340-20	HPPG-ESU-TU099A-020	Total/NA	Solid	Fill_Geo-21	489020
160-40340-21	HPPG-ESU-TU099A-021	Total/NA	Solid	Fill_Geo-21	489020
160-40340-22	HPPG-ESU-TU099A-022	Total/NA	Solid	Fill_Geo-21	489020
160-40340-23	HPPG-ESU-TU099A-023	Total/NA	Solid	Fill_Geo-21	489020
160-40340-24	HPPG-ESU-TU099A-024	Total/NA	Solid	Fill_Geo-21	489020
MB 160-489851/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	11
LCS 160-489851/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	12
160-40340-24 DU	HPPG-ESU-TU099A-024	Total/NA	Solid	Fill_Geo-21	489020

Prep Batch: 489908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-25	HPPG-ESU-TU099A-025	Total/NA	Solid	Fill_Geo-21	489020
160-40340-26	HPPG-F-029	Total/NA	Solid	Fill_Geo-21	489020
160-40340-27	HPPG-F-030	Total/NA	Solid	Fill_Geo-21	489020
LCS 160-489908/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-1	HPPG-ESU-TU099A-001	Total/NA	Solid	DPS-7	489016
160-40340-11	HPPG-ESU-TU099A-011	Total/NA	Solid	DPS-7	489016
160-40340-21	HPPG-ESU-TU099A-021	Total/NA	Solid	DPS-7	489020
160-40340-26	HPPG-F-029	Total/NA	Solid	DPS-7	489020
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Tracer/Carrier Summary

Page 102 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1
SDG: GJ46599773

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)									
160-40340-1	HPPG-ESU-TU099A-001	96.4	93.1									
160-40340-11	HPPG-ESU-TU099A-011	98.8	91.2									
160-40340-21	HPPG-ESU-TU099A-021	100	90.8									
160-40340-26	HPPG-F-029	95.5	88.2									
LCS 160-492111/1-A	Lab Control Sample	102	94.6									
MB 160-492111/22-A	Method Blank	96.8	94.6									

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier



Environment Testing America



ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40342-1
Laboratory Sample Delivery Group: D1189462
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/6/2021 5:23:43 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	12
QC Association Summary	13
Tracer Carrier Summary	14

Case Narrative

Page 105 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Job ID: 160-40342-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40342-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Job ID: 160-40342-1 (Continued)**Laboratory: Eurofins TestAmerica, St. Louis (Continued)**

receipt was 12.2 C.

STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU099A-B-001 (160-40342-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/13/2020, prepared on 12/16/2020 and analyzed on 01/04/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

The following sample could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: HPPG-ESU-TU099A-B-001 (160-40342-1). The samples contained small rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU099A-B-001 (160-40342-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/13/2020, prepared on 11/20/2020 and analyzed on 12/11/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 489908

The MB z-score for Bi-214/Ra-226 associated with Prep Batch 160-489908 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489908/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-028

Page 1 of 2

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-
0760
Address: 4005 Port Chicago
Hwy

Sample Lead: Murri, Andrew
Sample Tech(s): Paul Leblanc
Joaquin Ramirez

Project Number: 501197

Project Name: G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 11/10/2020

Waybill Number: 4457 0225 5465

Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method								
HPPG-ESU-TU099A-B-001	11/7/2020	10:11	G	SO	1	16 oz. plastic jar	X	X	5	D1189462	

Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I	II	III	Project Specific
Method Codes C = Composite G = Grab									

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/07/2020 15:07	Locked Storage (RKilpack)		11/07/2020 15:07
Locked Storage (RKilpack)		11/10/2020 13:03	Andrew Murri		11/10/2020 13:03
Andrew Murri		11/10/2020 13:11	SHIPPED TO LAB		11/10/2020 09:05

*** Last 3 transfers shown above - Complete list of transfers on last page ***



160-40342 Chain of Custody

1
2
3
4
5
6
7
8
9
10
11
12

All Transfers for COC 501197RSY-028

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/07/2020 15:07	Locked Storage (RKillpack)		11/07/2020 15:07
Locked Storage (RKillpack)		11/10/2020 13:03	Andrew Murri		11/10/2020 13:03
Andrew Murri		11/10/2020 13:11	SHIPPED TO LAB Via FEDEX		11/11/2020 09:08

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40342-1

SDG Number: D1189462

Login Number: 40342**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Page 110 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Page 111 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Page 112 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40342-1	HPPG-ESU-TU099A-B-001	Solid	11/07/20 10:11	11/11/20 09:05	

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Eurofins TestAmerica, St. Louis

Client Sample Results

Page 113 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Client Sample ID: HPPG-ESU-TU099A-B-001

Lab Sample ID: 160-40342-1

Matrix: Solid

Date Collected: 11/07/20 10:11

Date Received: 11/11/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	0.0492	U	0.150	0.150	0.331	0.119	pCi/g	12/16/20 14:29	01/04/21 13:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	90.9		40 - 110					12/16/20 14:29	01/04/21 13:54	1
Y Carrier	87.9		40 - 110					12/16/20 14:29	01/04/21 13:54	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.325		0.242	0.245		0.125	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Actinium-227	0.151	U	0.292	0.293		0.371	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Bismuth-212	-0.470	U	1.19	1.19		0.948	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Bismuth-214	0.621		0.147	0.161		0.0483	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Cesium-137	-0.0273	U	0.0808	0.0808	0.0700	0.0642	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Lead-210	-0.310	U	1.98	1.98		1.64	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Lead-212	0.330		0.113	0.121		0.0733	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Lead-214	0.327		0.134	0.139		0.0632	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Potassium-40	9.92		1.66	1.95		0.284	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Protactinium-231	0.000	U	0.795	0.795		2.50	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Protactinium-234	0.0000363	U	0.000139	0.000139		0.247	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Radium-226	0.621		0.147	0.161	0.200	0.0483	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Radium-228	0.325		0.242	0.245		0.125	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Thallium-208	0.164		0.0548	0.0574		0.0177	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Thorium 228	0.330		0.113	0.121		0.0733	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Thorium-232	0.325		0.242	0.245		0.125	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Thorium-234	-0.147	U	1.28	1.28		1.06	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Uranium-235	-0.00863	U	0.326	0.326		0.427	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Uranium-238	-0.147	U	1.28	1.28		1.06	pCi/g	11/20/20 16:22	12/11/20 12:38	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Page 114 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-492111/22-A

Matrix: Solid

Analysis Batch: 493835

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 492111

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.					
Strontium-90	-0.03798	U		0.125	0.125	0.331	pCi/g	12/16/20 14:29	01/04/21 13:58	1
Carrier										
Sr Carrier	MB	MB	Qualifier	%Yield	Limits	DLC	Unit	Prepared	Analyzed	Dil Fac
	96.8			96.8	40 - 110					
Y Carrier	MB	MB	Qualifier	%Yield	Limits	DLC	Unit	Prepared	Analyzed	Dil Fac
	94.6			94.6	40 - 110					

Lab Sample ID: LCS 160-492111/1-A

Matrix: Solid

Analysis Batch: 493723

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 492111

Analyte	MB	MB	Qualifier	Spike	LCS	LCS	Total	DLC	Unit	%Rec.
	Result	Uncert.		Added	Result	Qual	Uncert.			
Strontium-90	-0.03798	U		7.75	6.756		0.712	0.331	pCi/g	87
Carrier										
Sr Carrier	MB	MB	Qualifier	%Yield	Limits	DLC	Unit	Prepared	Analyzed	Dil Fac
	96.8			96.8	40 - 110					
Y Carrier	MB	MB	Qualifier	%Yield	Limits					
	94.6			94.6	40 - 110					

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: LCS 160-489908/2-A

Matrix: Solid

Analysis Batch: 491438

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 489908

Analyte	MB	MB	Qualifier	Spike	LCS	LCS	Total	DLC	Unit	%Rec.
	Result	Uncert.		Added	Result	Qual	Uncert.			
Americium-241	-0.03798	U		96.4	98.60		12.8	0.643	pCi/g	102
Cesium-137	-0.03798	U		26.7	29.83		3.54	0.135	pCi/g	112
Cobalt-60	-0.03798	U		9.47	10.16		1.22	0.0830	pCi/g	107

Eurofins TestAmerica, St. Louis

QC Association Summary

Page 115 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Rad

Leach Batch: 489020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40342-1	HPPG-ESU-TU099A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 489908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40342-1	HPPG-ESU-TU099A-B-001	Total/NA	Solid	Fill_Geo-21	489020
LCS 160-489908/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40342-1	HPPG-ESU-TU099A-B-001	Total/NA	Solid	DPS-7	489020
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

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Tracer/Carrier Summary

Page 116 of 116

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1
SDG: D1189462

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)										
160-40342-1	HPPG-ESU-TU099A-B-001	90.9	87.9										
LCS 160-492111/1-A	Lab Control Sample	102	94.6										
MB 160-492111/22-A	Method Blank	96.8	94.6										

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier

Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report							
RSY Pad: RSY 1 Use1	Soil Origin: TU-077A ESU						
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/21/2021						

Systematic Soil Sample Data: RSY 1 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU077A-001	1	Systematic	12,484	15,359	0.358	-0.0129	-0.129
HPPG-ESU-TU077A-002	2	Systematic	11,854	15,359	0.539	0.0365	N/A
HPPG-ESU-TU077A-003	3	Systematic	11,173	15,359	0.397	0.0200	N/A
HPPG-ESU-TU077A-004	4	Systematic	11,638	15,359	0.637	-0.0252	N/A
HPPG-ESU-TU077A-005	5	Systematic	12,104	15,359	0.510	-0.0242	N/A
HPPG-ESU-TU077A-006	6	Systematic	9,786	15,359	0.373	-0.00184	N/A
HPPG-ESU-TU077A-007	7	Systematic	10,630	15,359	0.338	0.000	N/A
HPPG-ESU-TU077A-008	8	Systematic	10,627	15,359	0.505	-0.00532	N/A
HPPG-ESU-TU077A-009	9	Systematic	11,882	15,359	0.329	-0.0116	N/A
HPPG-ESU-TU077A-010	10	Systematic	11,971	15,359	0.381	0.0164	N/A
HPPG-ESU-TU077A-011	11	Systematic	11,753	15,359	0.456	-0.0198	0.154
HPPG-ESU-TU077A-012	12	Systematic	11,473	15,359	0.481	-0.0442	N/A
HPPG-ESU-TU077A-013	13	Systematic	11,648	15,359	0.423	0.00301	N/A
HPPG-ESU-TU077A-014	14	Systematic	11,472	15,359	0.458	0.0297	N/A
HPPG-ESU-TU077A-015	15	Systematic	12,454	15,359	0.309	-0.0139	N/A
HPPG-ESU-TU077A-016	16	Systematic	11,213	15,359	0.280	0.0125	N/A
HPPG-ESU-TU077A-017	17	Systematic	10,923	15,359	0.517	-0.0159	N/A
HPPG-ESU-TU077A-018	18	Systematic	12,332	15,359	0.600	0.000	N/A
HPPG-ESU-TU077A-019	19	Systematic	12,099	15,359	0.374	0.0269	N/A
HPPG-ESU-TU077A-020	20	Systematic	12,256	15,359	0.526	0.0290	N/A
HPPG-ESU-TU077A-021	21	Systematic	11,773	15,359	0.169	-0.0169	-0.0369
HPPG-ESU-TU077A-022	22	Systematic	9,882	15,359	0.329	-0.0478	N/A
HPPG-ESU-TU077A-023	23	Systematic	10,717	15,359	0.278	-0.0488	N/A
HPPG-ESU-TU077A-024	24	Systematic	11,355	15,359	0.460	-0.0352	N/A
HPPG-ESU-TU077A-025	25	Systematic	11,338	15,359	0.510	-0.0461	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
					Maximum	0.637	0.0365
					Mean	0.4215	-0.0078
					Median	0.423	-0.0116
					Minimum	0.169	-0.0488
					Standard Deviation	0.1107	0.0256

Biased Soil Sample Data: RSY 1 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*							
HPPG-ESU-TU077A-B-001	1	Biased	12,477	15,359	0.547	0.00825	-0.0903

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11102020-PG-ROV-292	11/10/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11112020-PG-JSS-293	11/11/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11112020-PG-JSS-294	11/11/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11112020-PG-JSS-295	11/11/2020	3x3	10/09/2021	271420

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 1 Use 1
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 43 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
2) One-minute static follow-up measurements with the RS-700 were collected at 43 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-56. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 57-95). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for ⁹⁰ Strontium. Strontium-90 results are also included in the TestAmerica sample results report (pages 57-95). Samples HPPG-F-033 and HPPG-F-034 are field duplicates, correlating to systematic samples -001 and -017. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 96-110). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
Conclusions:
In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.
RSY 1 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-077A ESU.
APTIM requests RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be used as backfill for TU-077.

Soil Scan Statistics

Statistical Summary

Dataset		PG-RSY-01-U1				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		4.01	36.08	16.96	17.04	4.26
ROI-06		63.15	157.33	109.95	110.24	12.87
ROI-07		46.10	118.26	84.03	84.19	10.63
ROI-08		76.16	186.47	137.45	137.32	14.46
ROI-10		2,087.41	3,173.51	2,789.23	2,812.95	159.38

Statistical Summary Reference Background

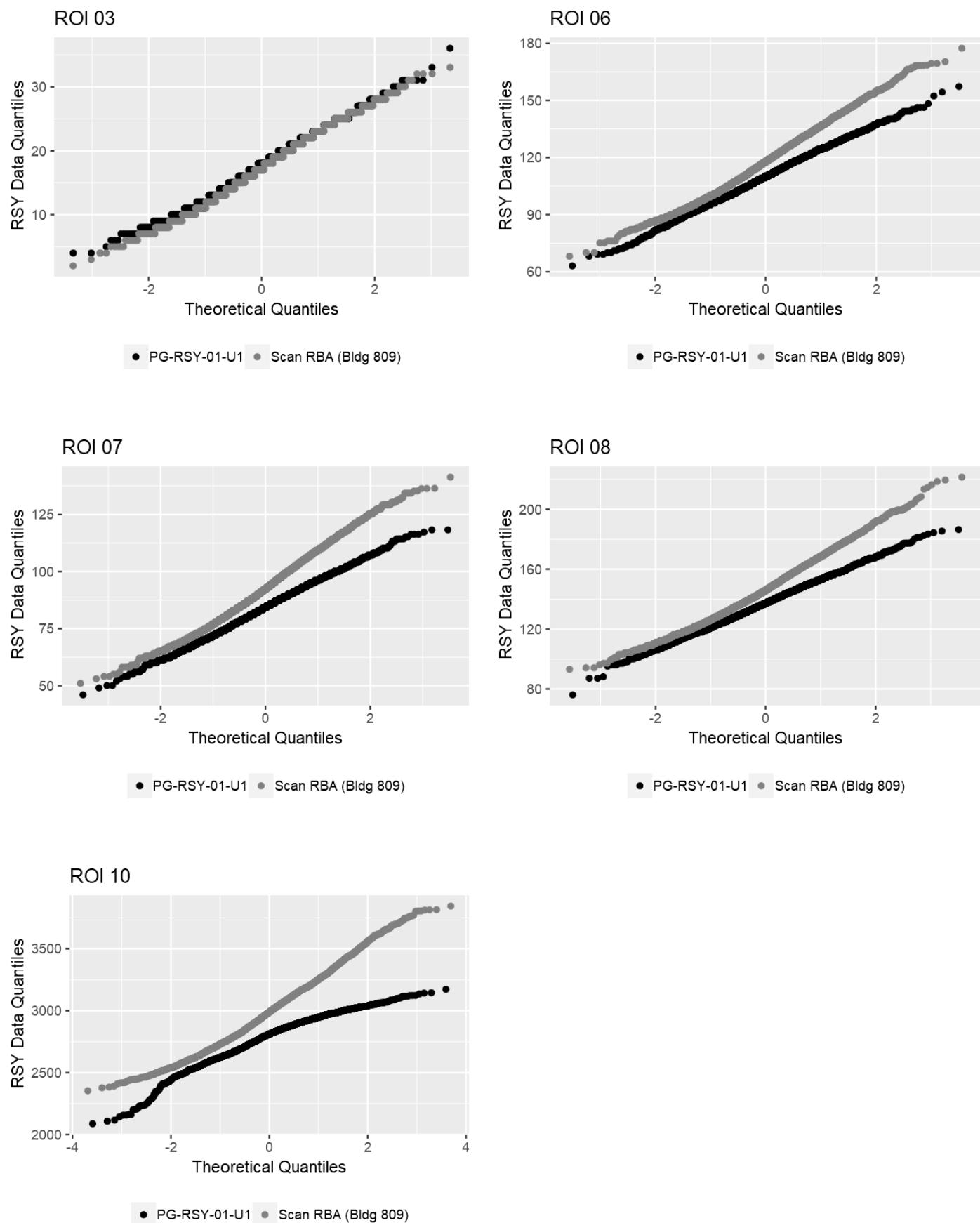
TYPE		Scan RBA (Bldg 809)				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	33.08	16.21	16.04	4.13
ROI-06		68.15	177.45	117.58	117.26	15.50
ROI-07		51.11	141.33	92.34	91.24	13.43
ROI-08		93.19	221.48	146.24	145.30	18.21
ROI-10		2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-01-U1	3106
Scan RBA (Bldg 809)	4632

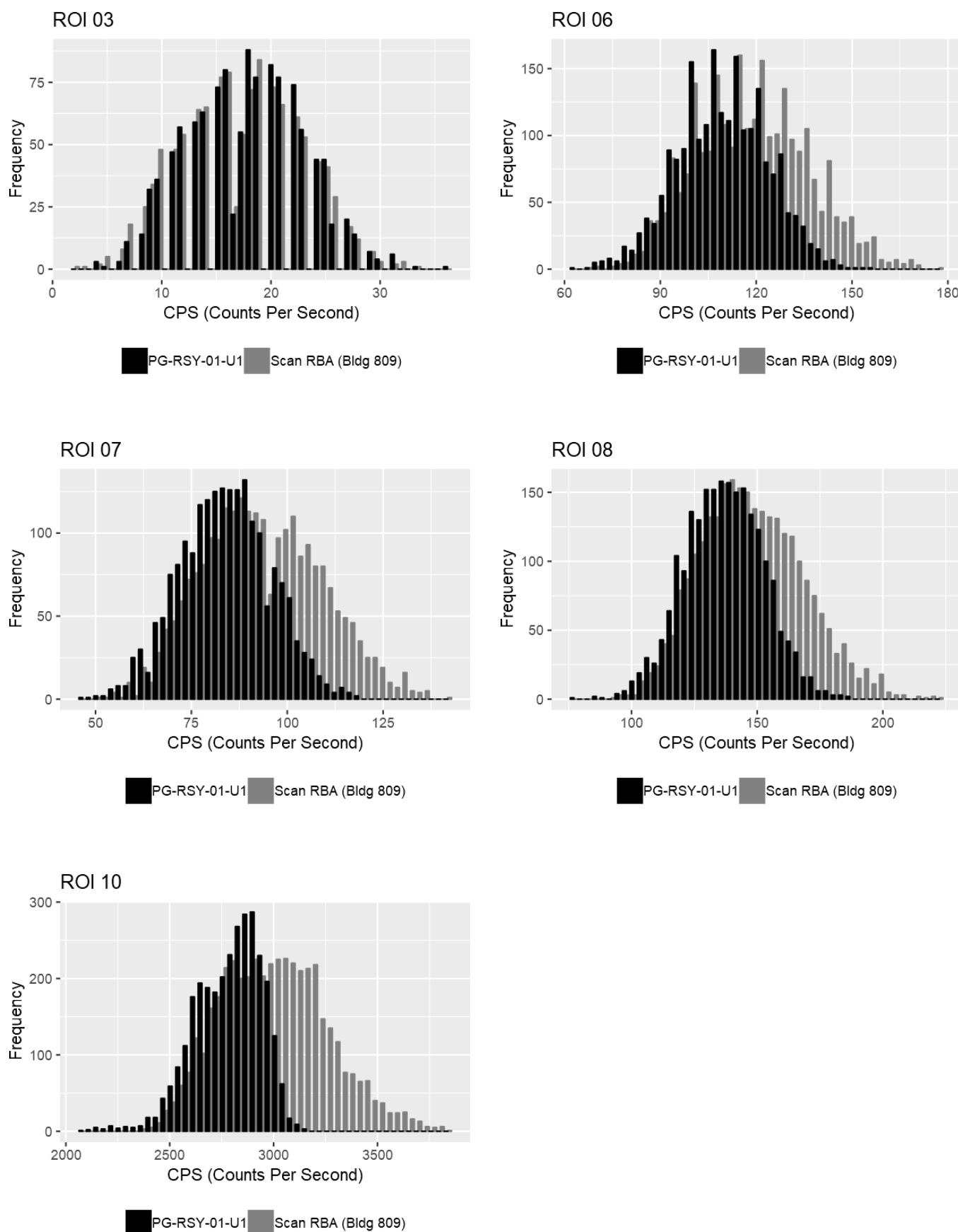
Soil Scan Statistics

Normal Q-Q Plots



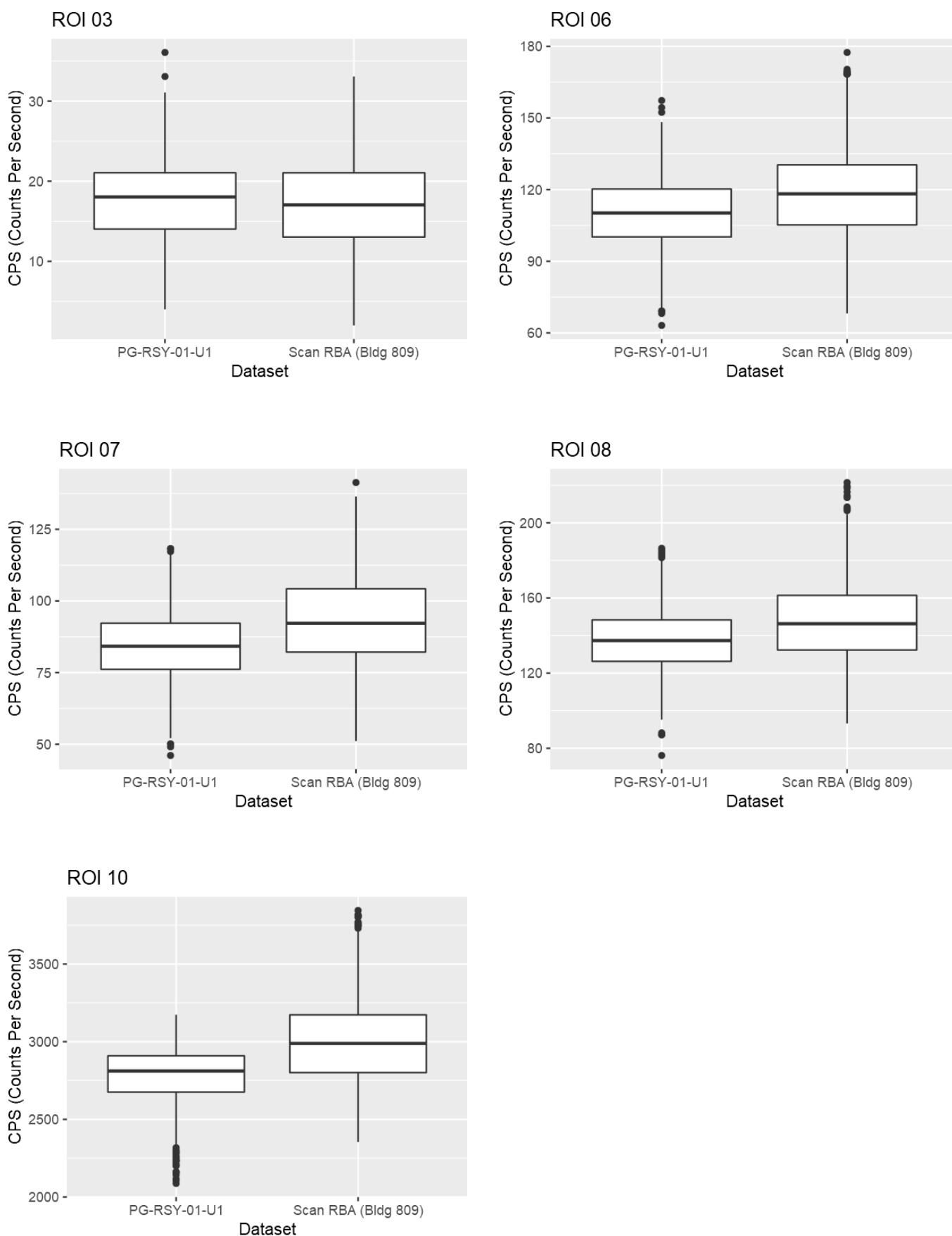
Soil Scan Statistics

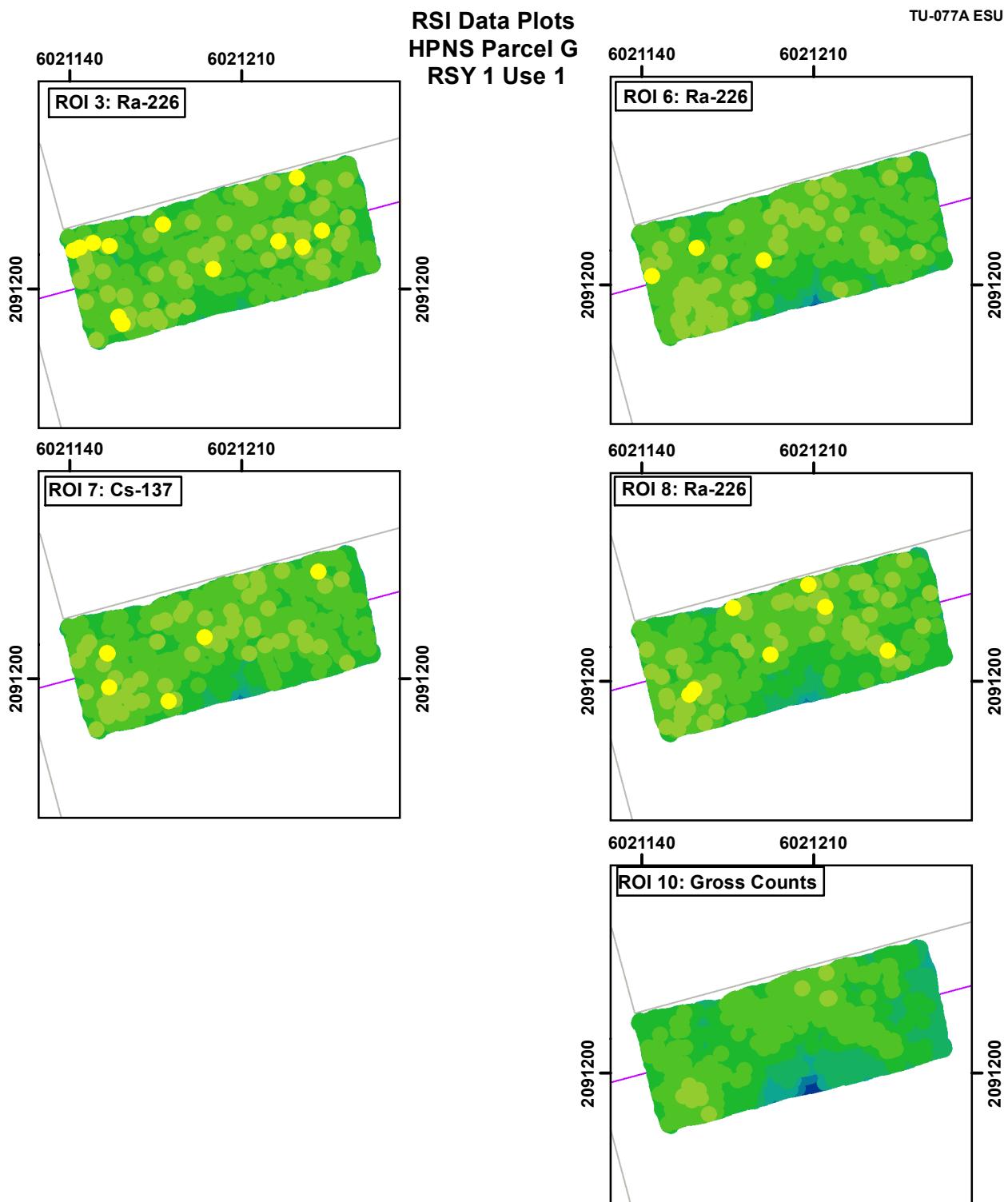
Histograms



Soil Scan Statistics

Box Plots

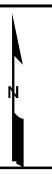




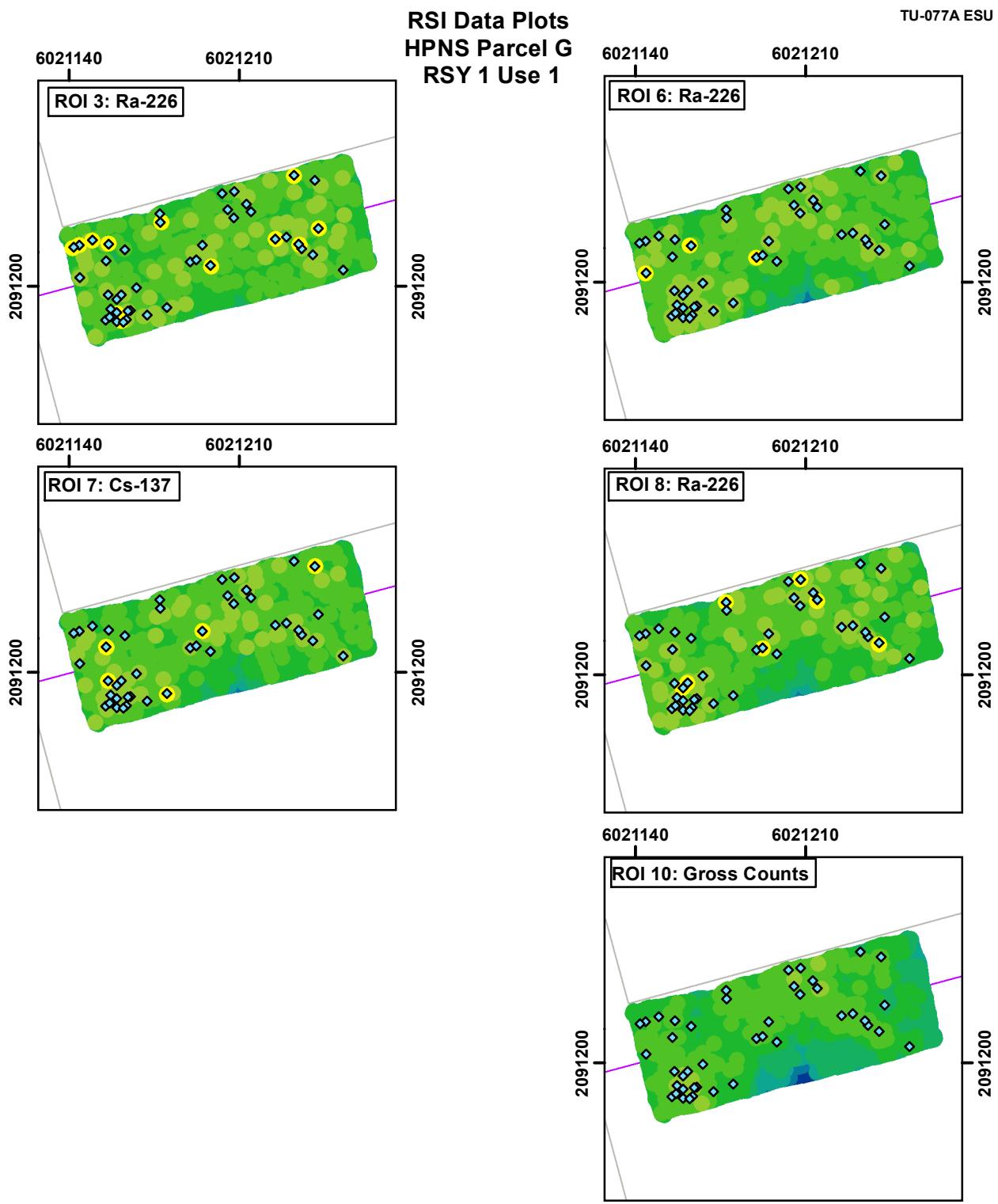
RS 700 Gamma Walkover Survey Data (VD1)

- Yellow circle: > 3 std dev
- Light Green circle: > -1 to < 0 std dev
- Medium Green circle: > 2 to < 3 std dev
- Dark Green circle: > -2 to < -1 std dev
- Dark Blue circle: > 1 to < 2 std dev
- Very Dark Blue circle: > -3 to < -2 std dev
- Black circle: > 0 to < 1 std dev
- Blue circle: < -3 std dev

Coordinate system: CSP Zone III, NAD83, US Survey Foot



APTIM



RS 700 Gamma Walkover Survey Data (VD1)

- ◆ Follow-Up Locations
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev
- > 0 to < 1 std dev
- > 1 to < 2 std dev
- > 2 to < 3 std dev
- > 3 std dev

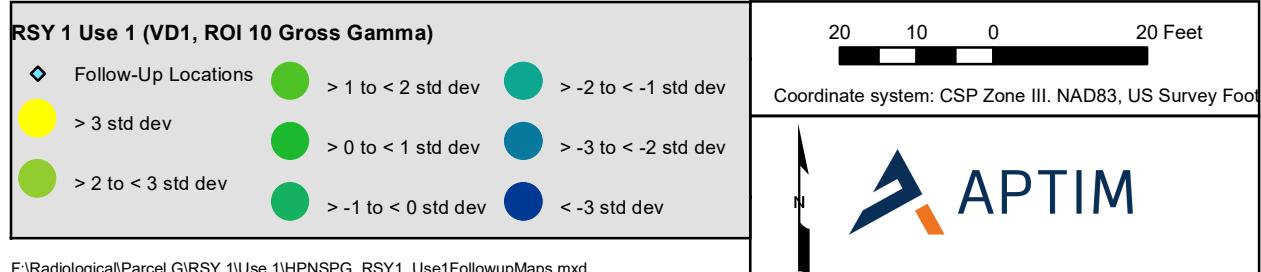
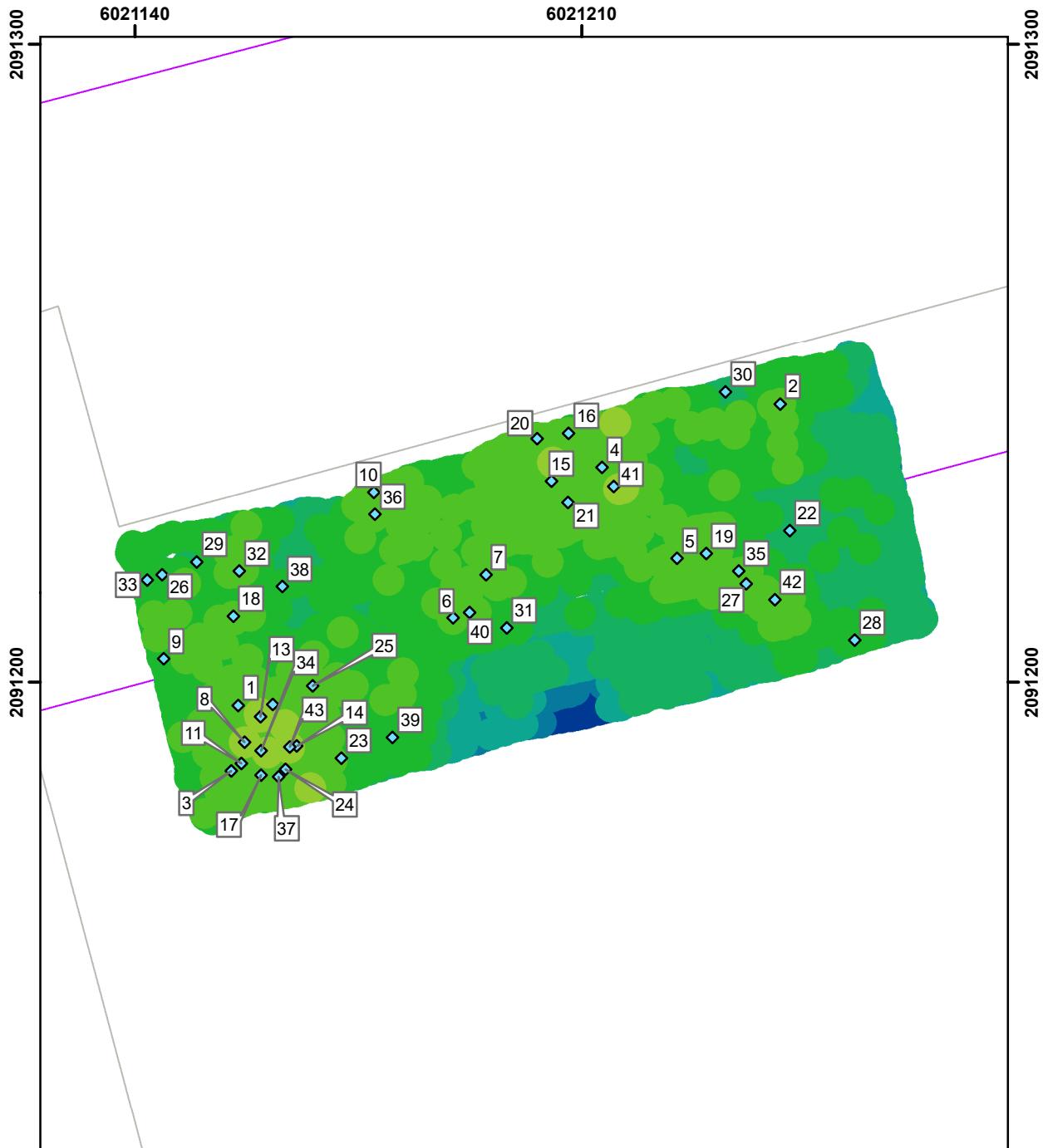
0 25 50 100
Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



**Follow-Up Static Survey
HPNS Parcel G
RSY 1 Use 1**

TU-077A ESU



**RSY 1 Use 1**

S Systematic Sample Locations

● RS-700 GWS Coverage

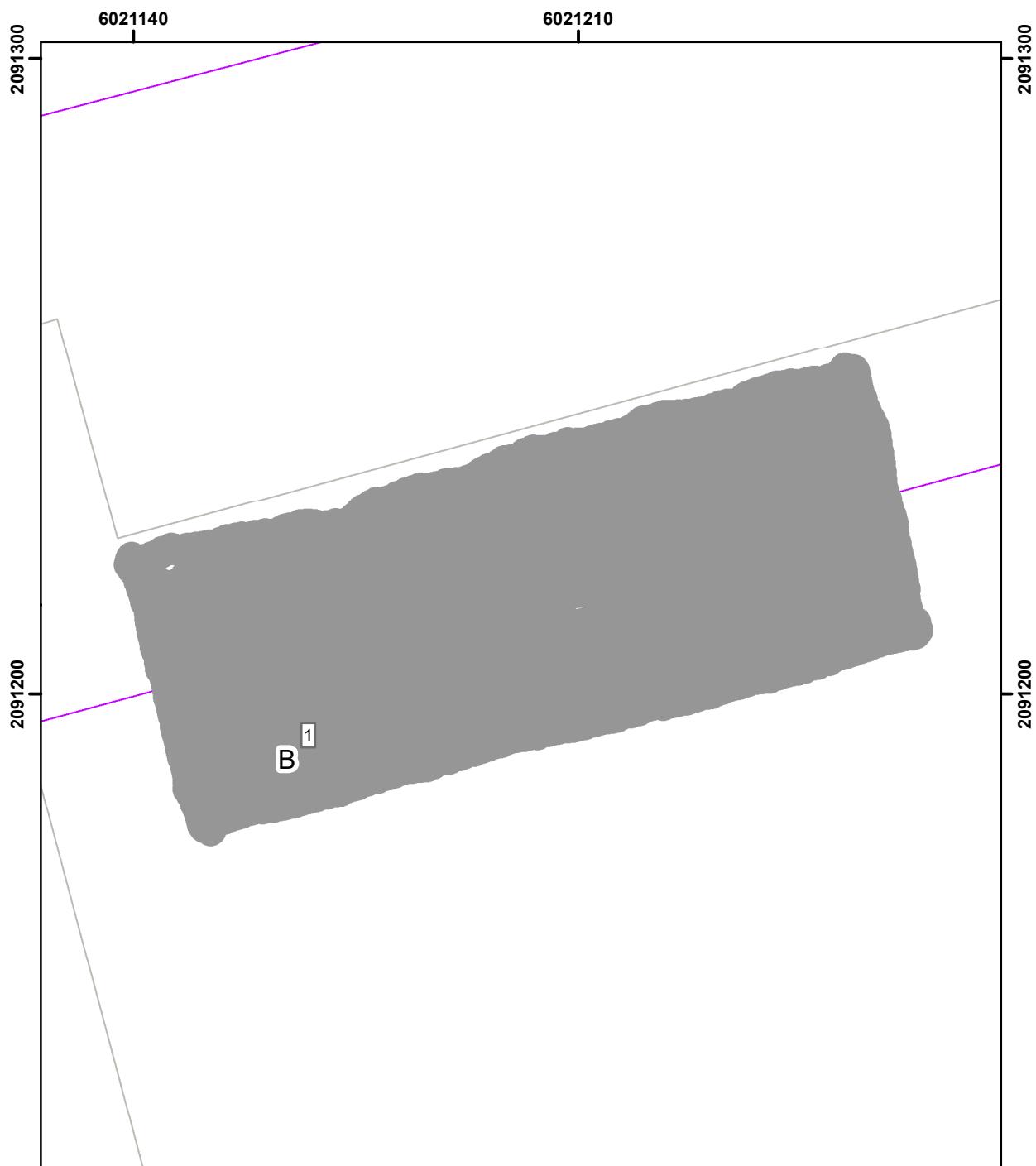
20 10 0 20 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



**Biased Sampling
HPNS Parcel G
RSY 1 Use 1**

TU-077A ESU

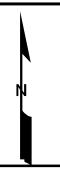


RSY 1 Use 1

- B Biased Sample Location
- RS-700 GWS Coverage

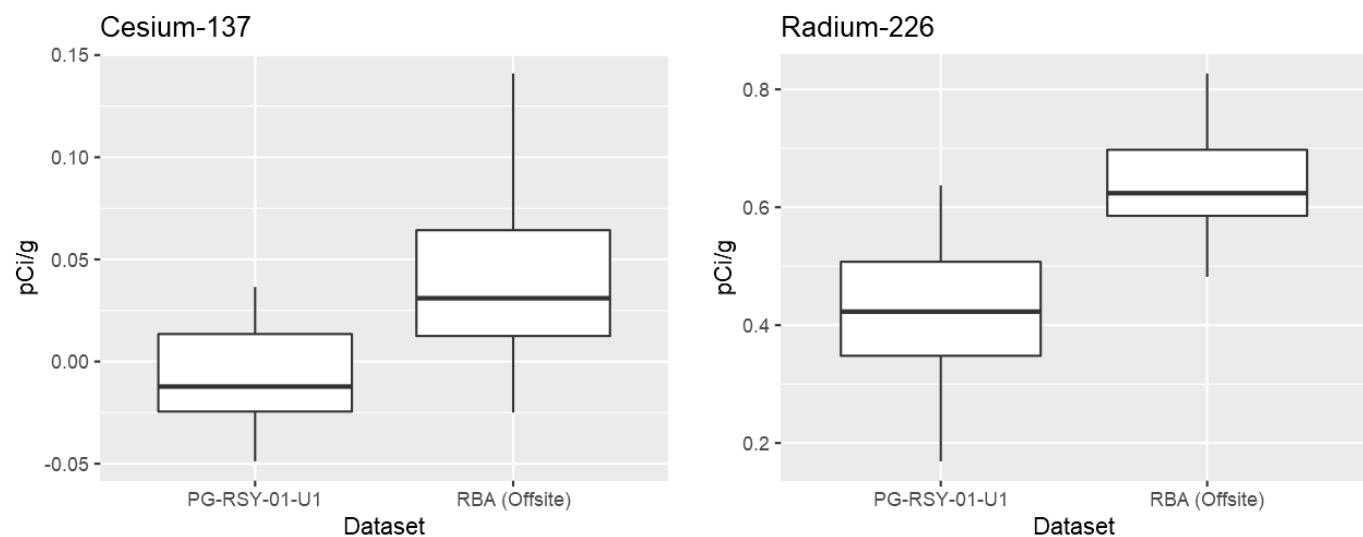
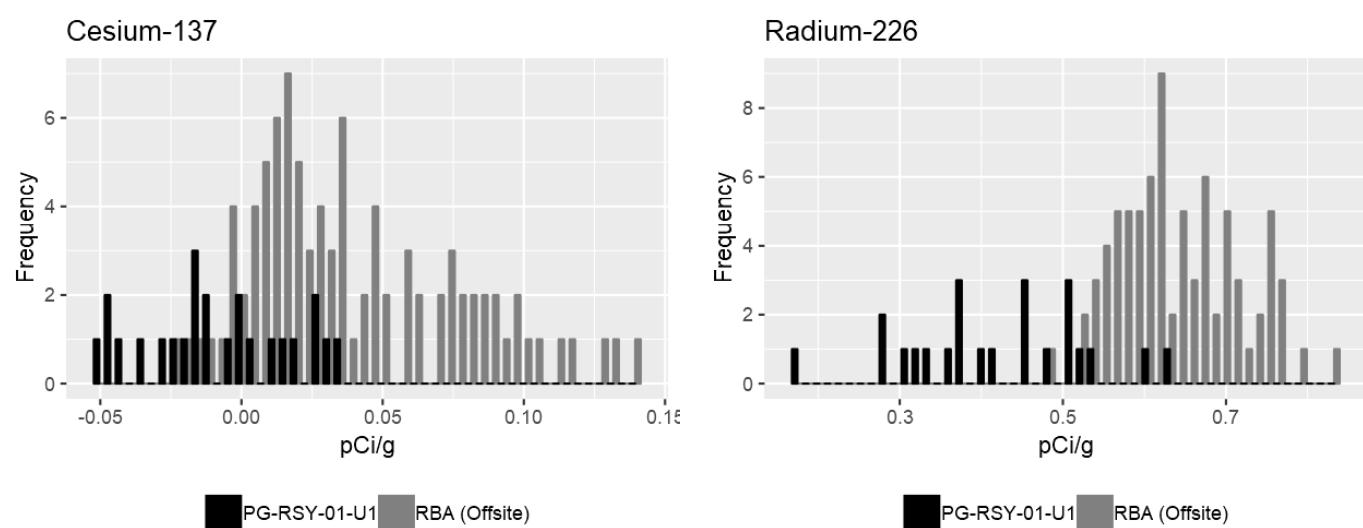
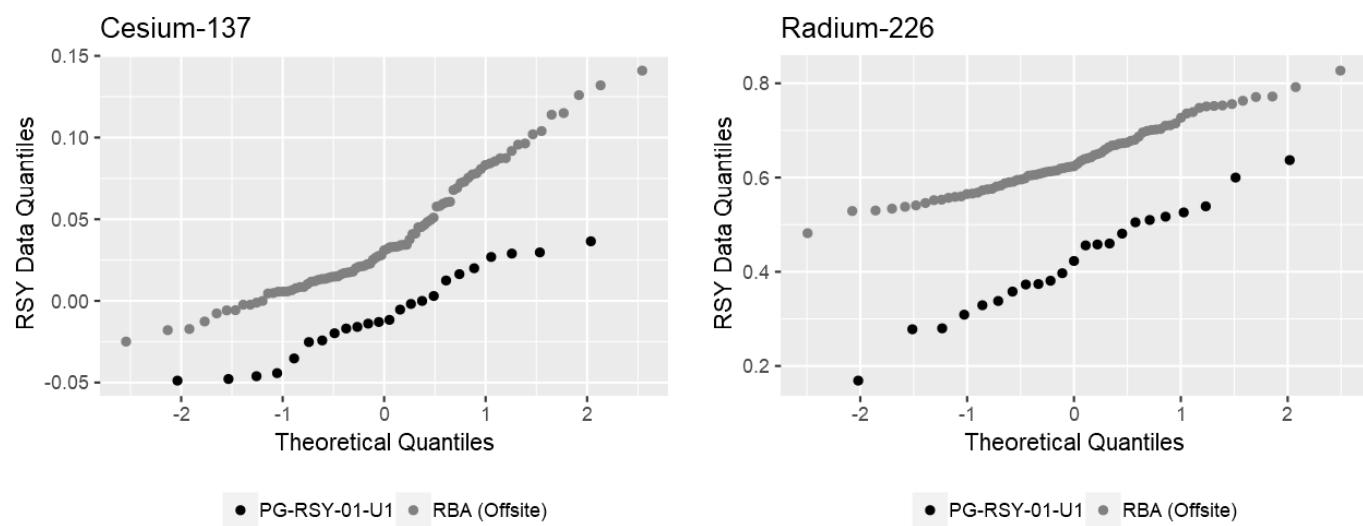
20 10 0 20 Feet

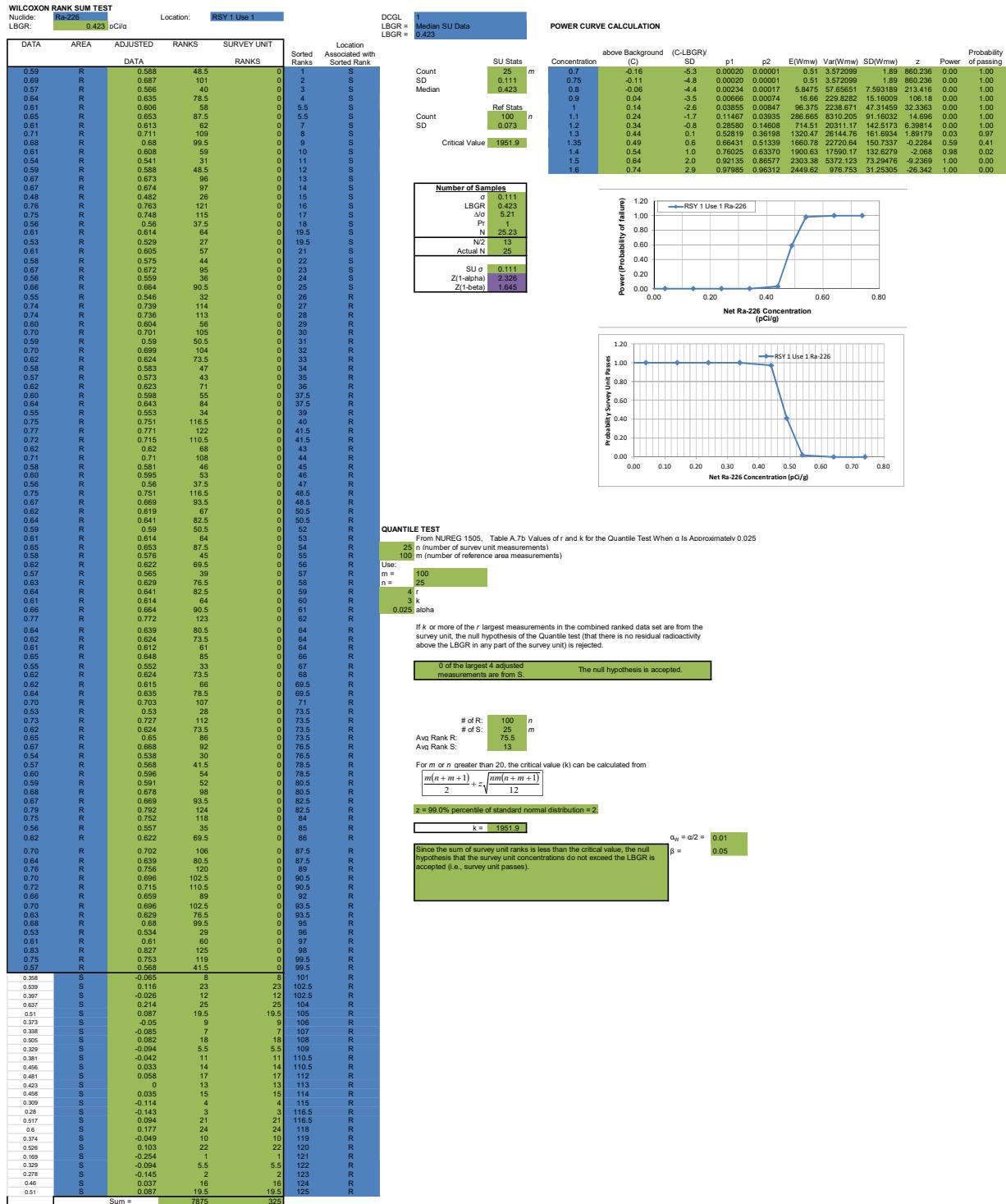
Coordinate system: CSP Zone III, NAD83, US Survey Foot



 **APTIM**

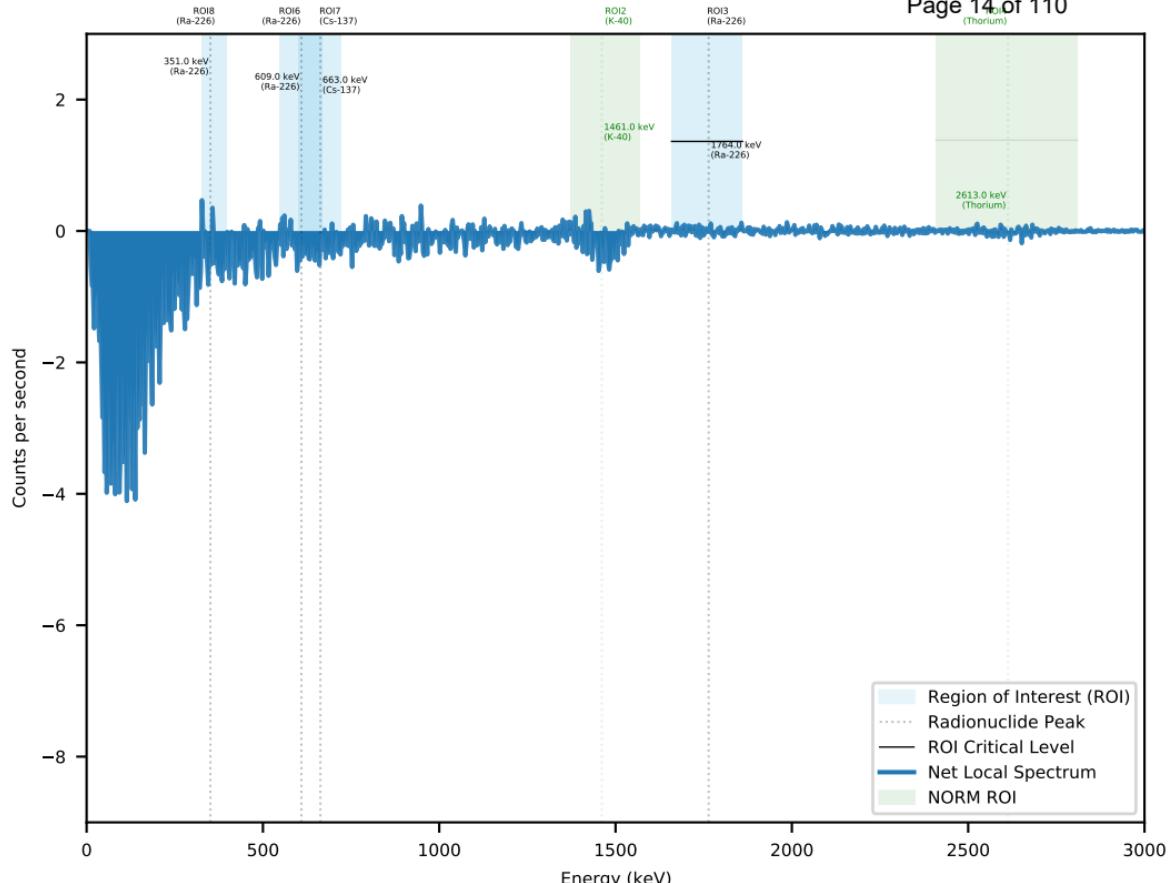
Soil Sample Statistics





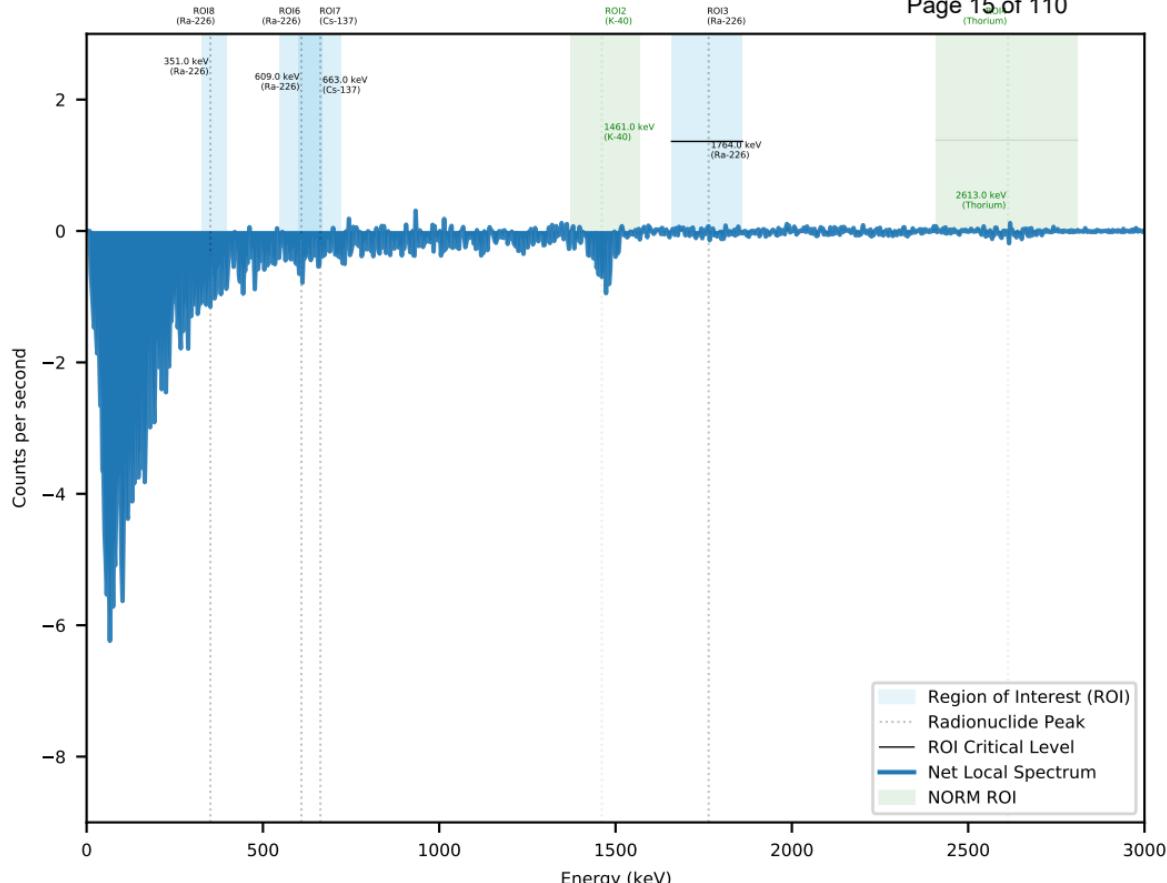
Net Gamma Spectrum, Static Location: 1

Page 14 of 110



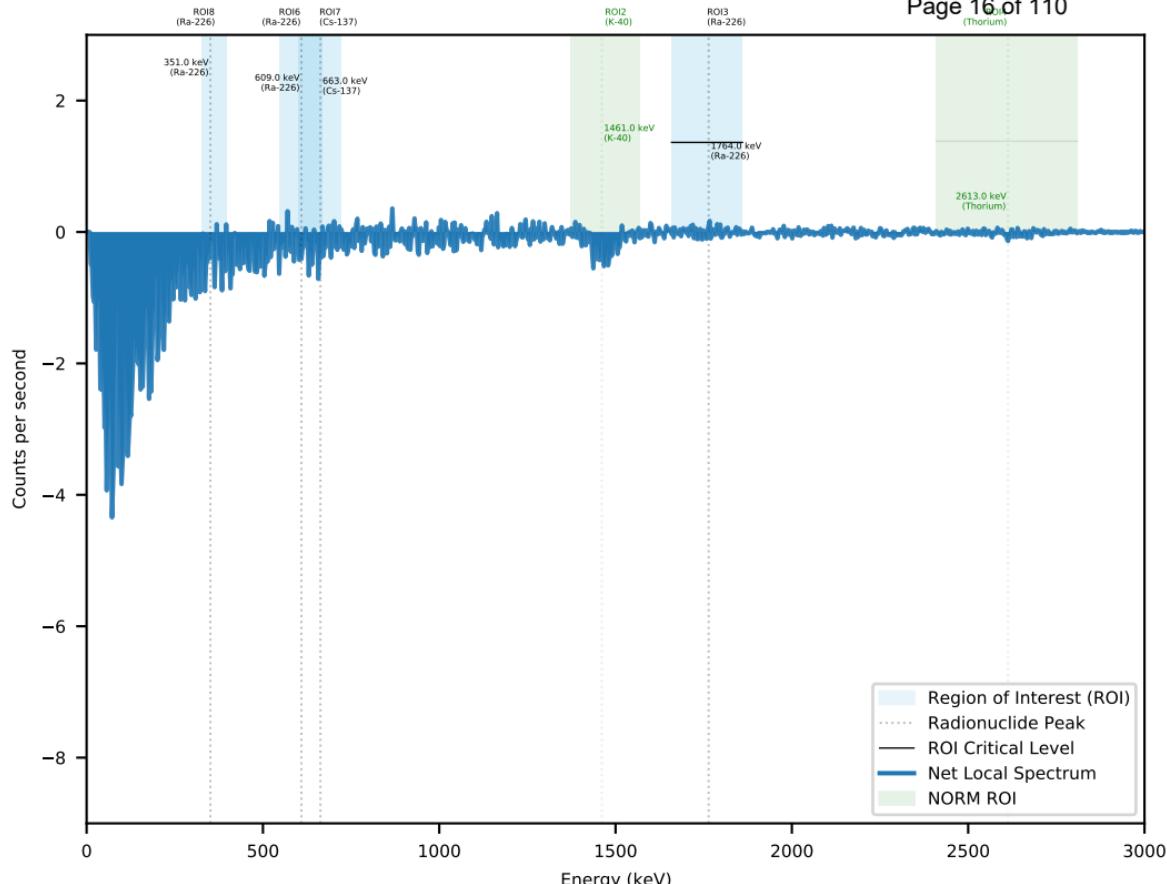
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Page 15 of 110
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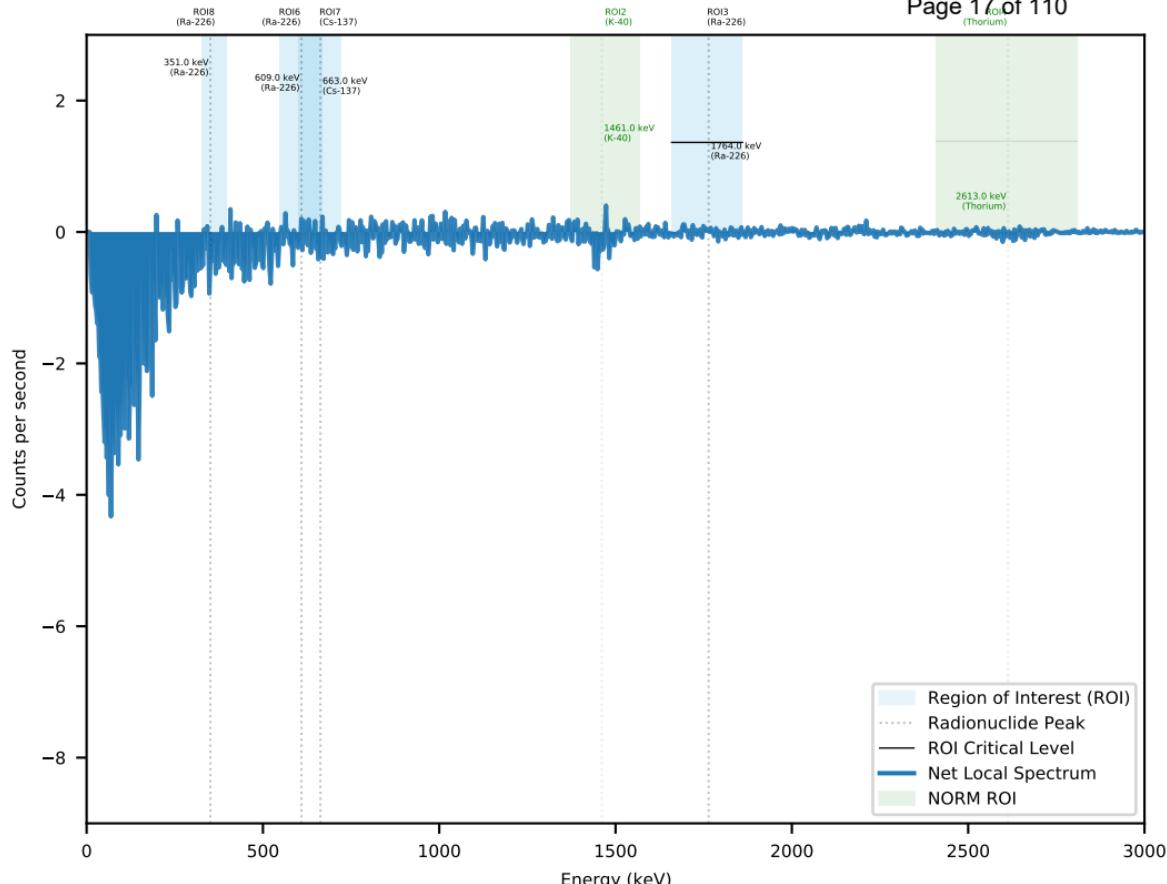
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Page 16 of 110
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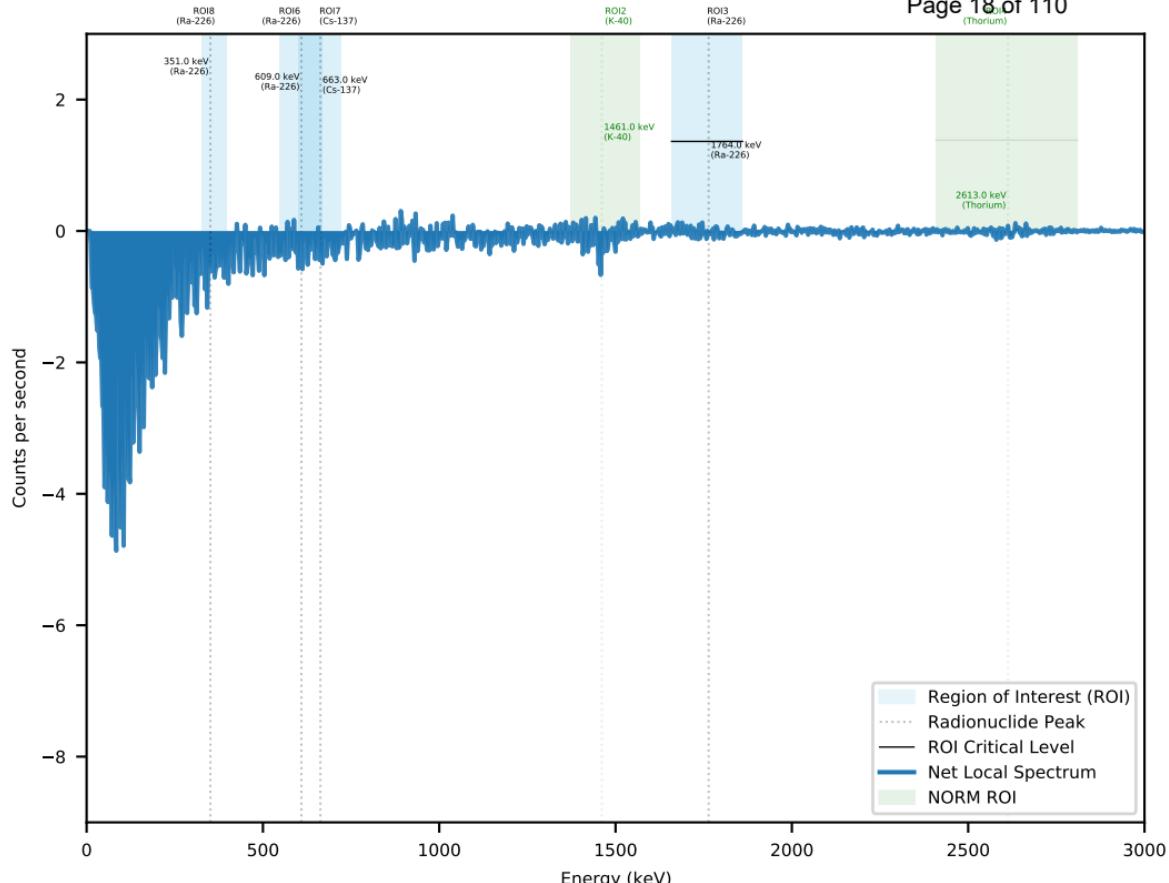
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Page 17 of 110
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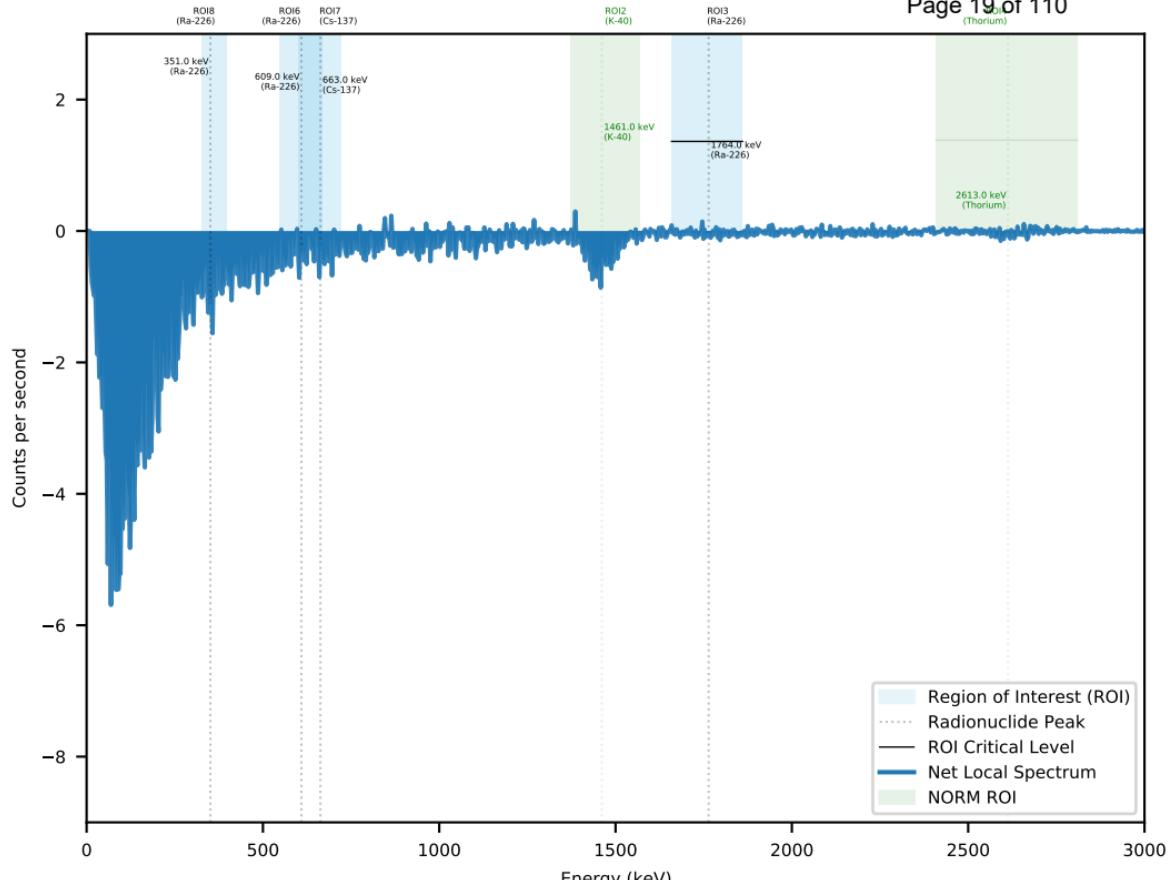
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Page 18 of 110
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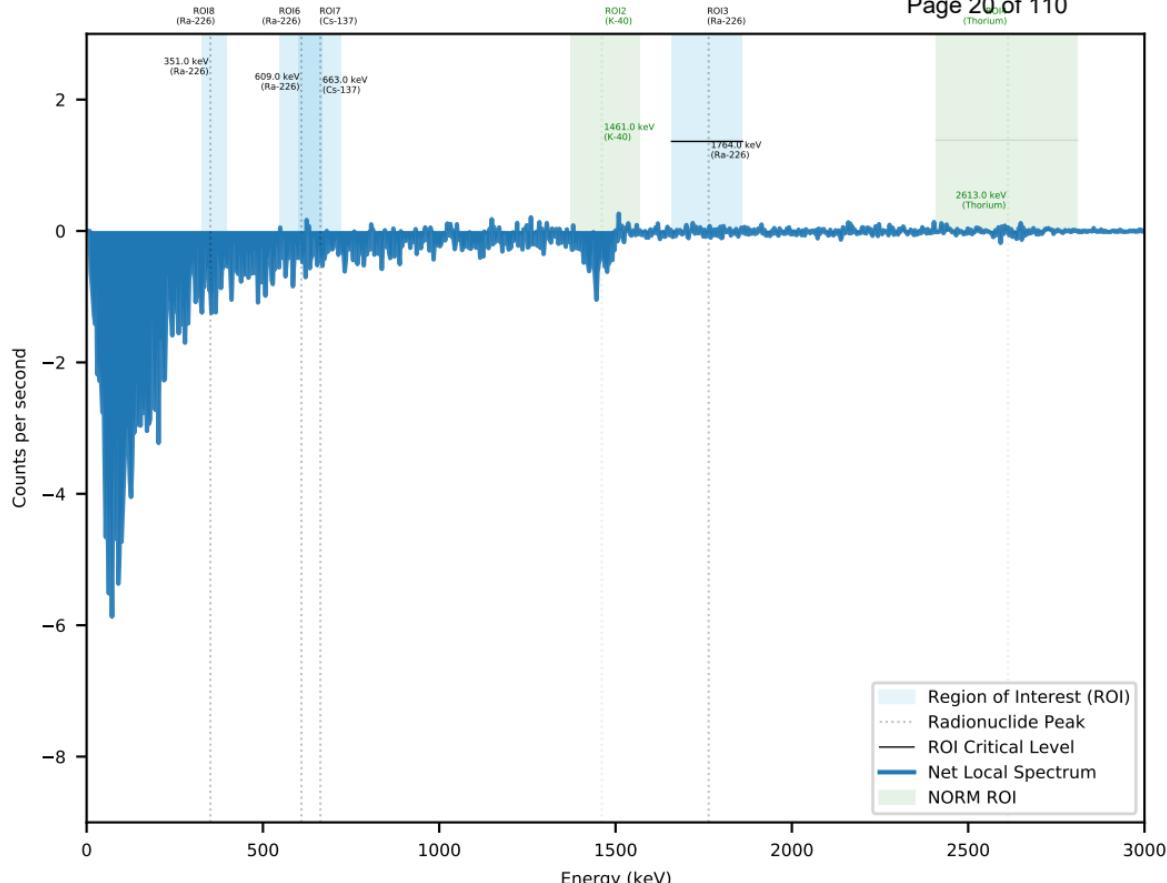
Net Gamma Spectrum, Static Location: 6

Page 19 of 110



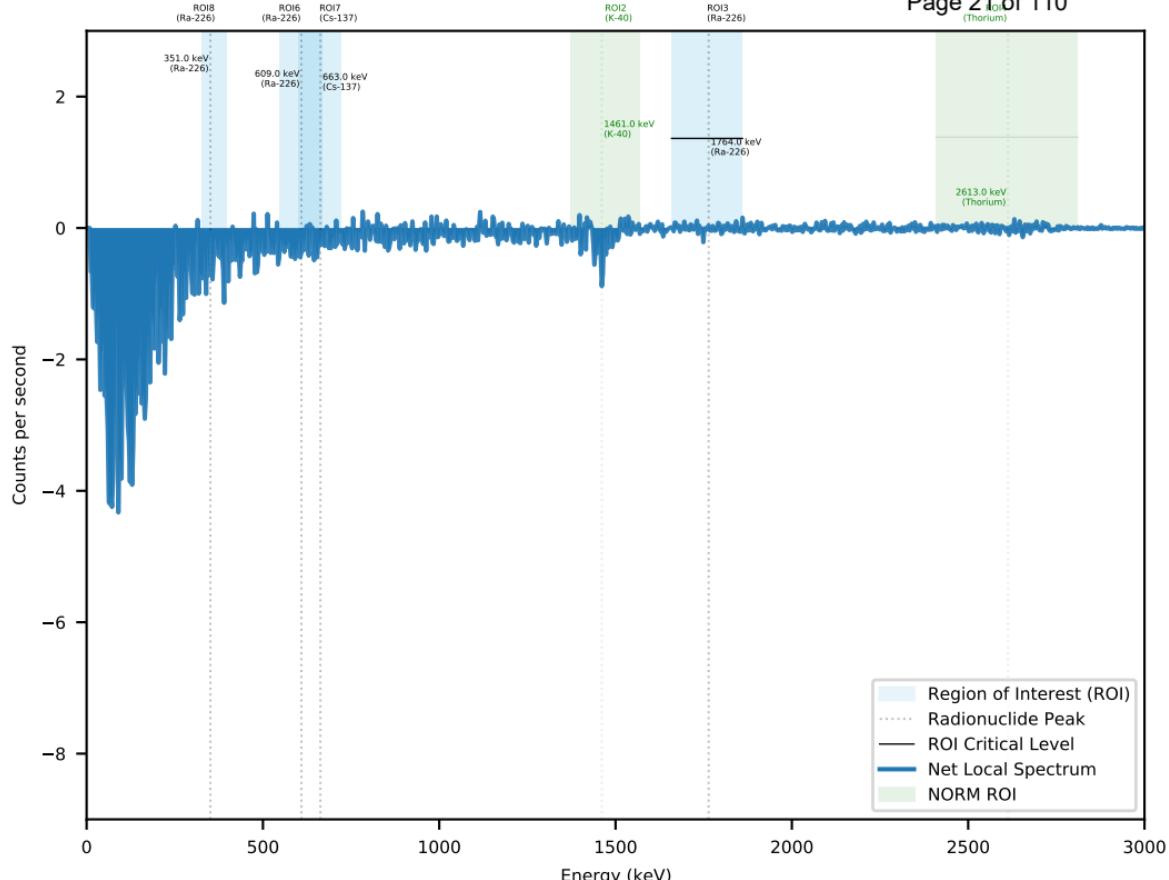
Net Gamma Spectrum, Static Location: 7

Page 20 of 110



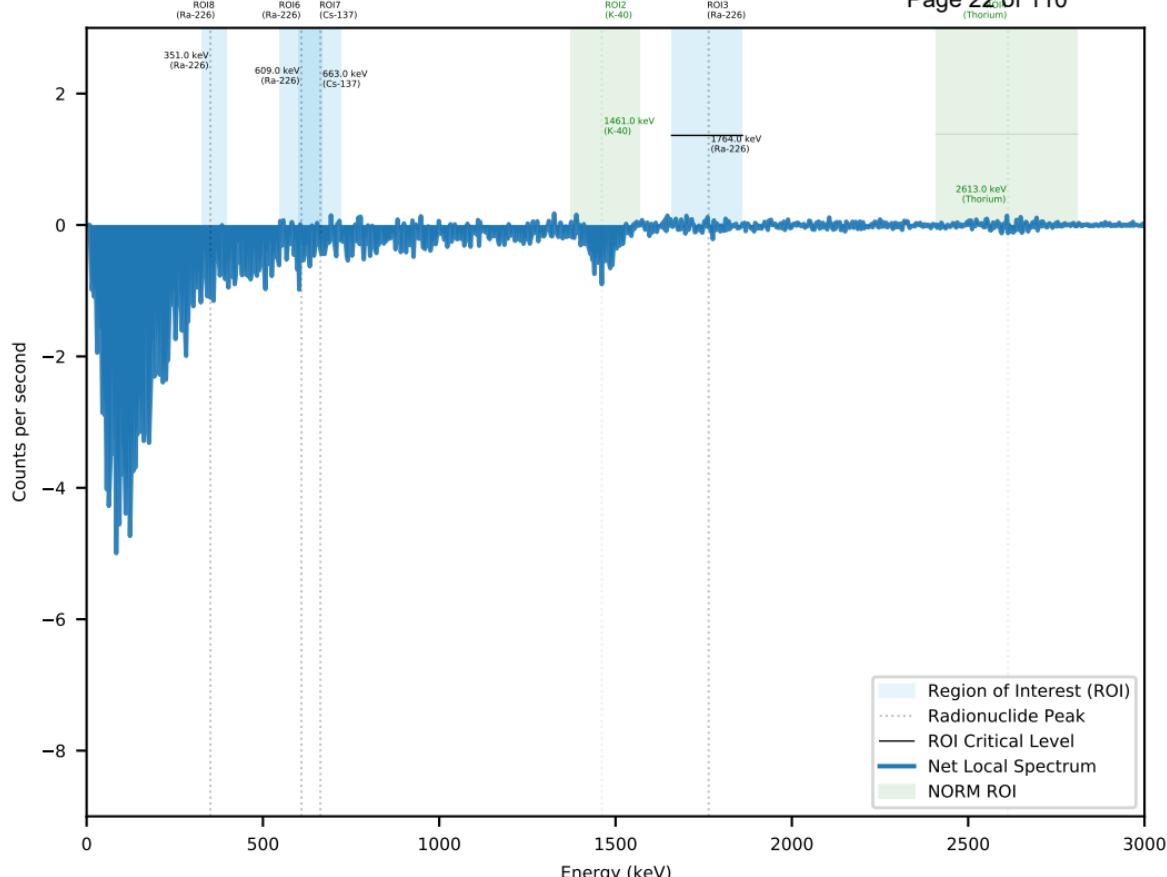
Net Gamma Spectrum, Static Location: 8

Page 21 of 110
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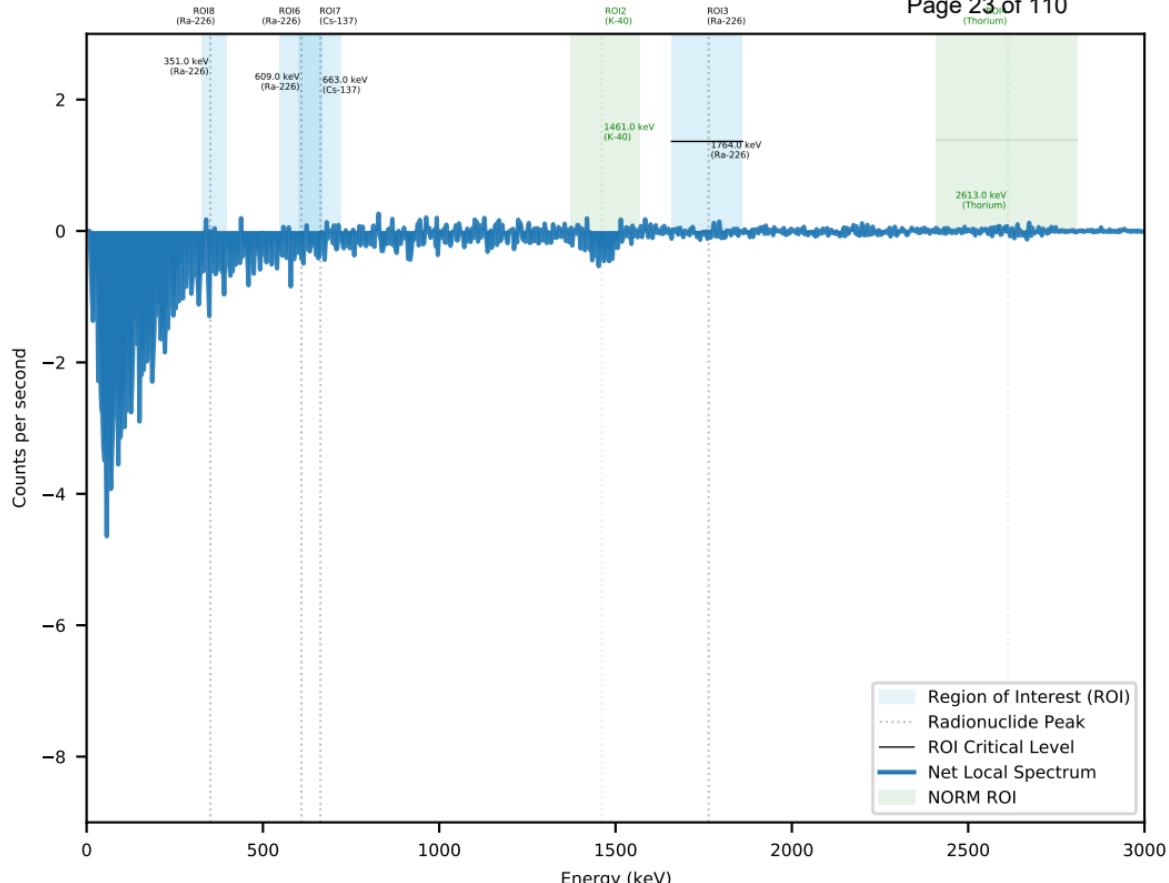
Net Gamma Spectrum, Static Location: 9

Page 22 of 110



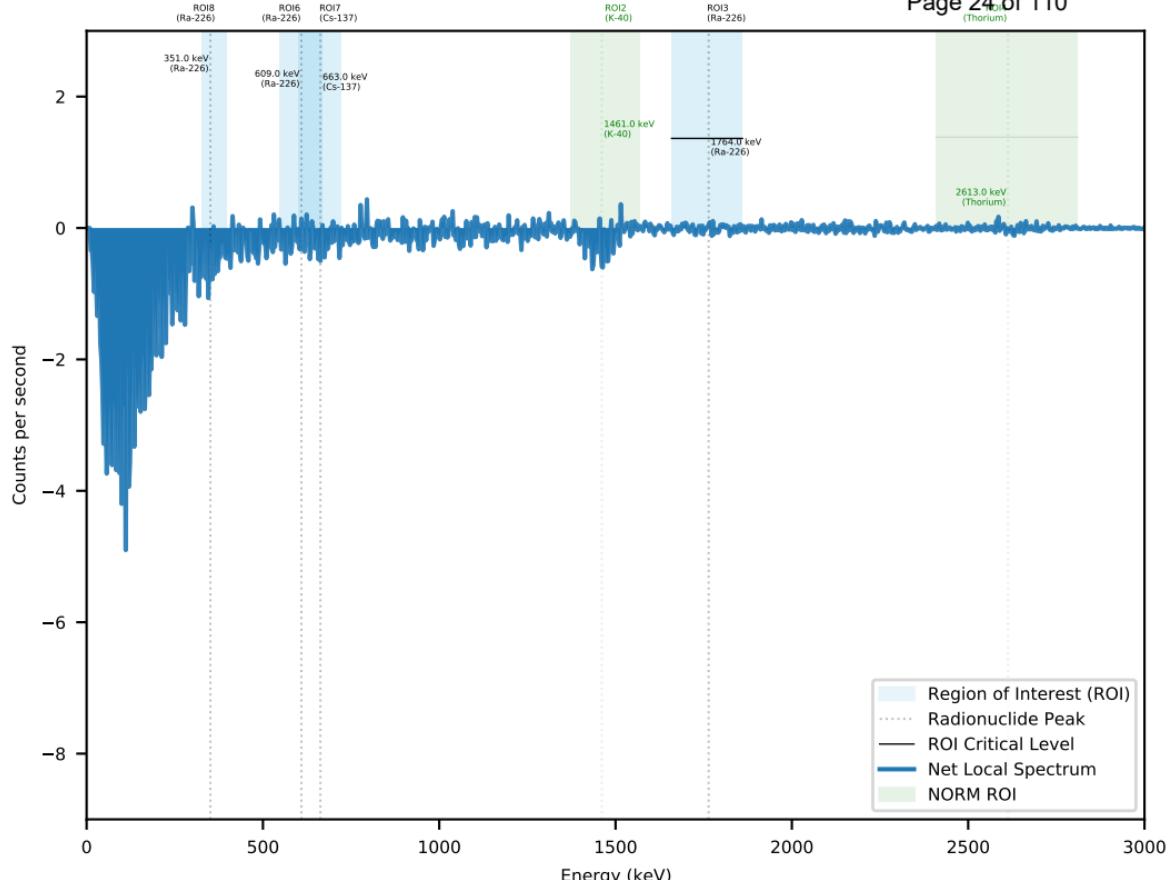
Net Gamma Spectrum, Static Location: 10

Page 23 of 110
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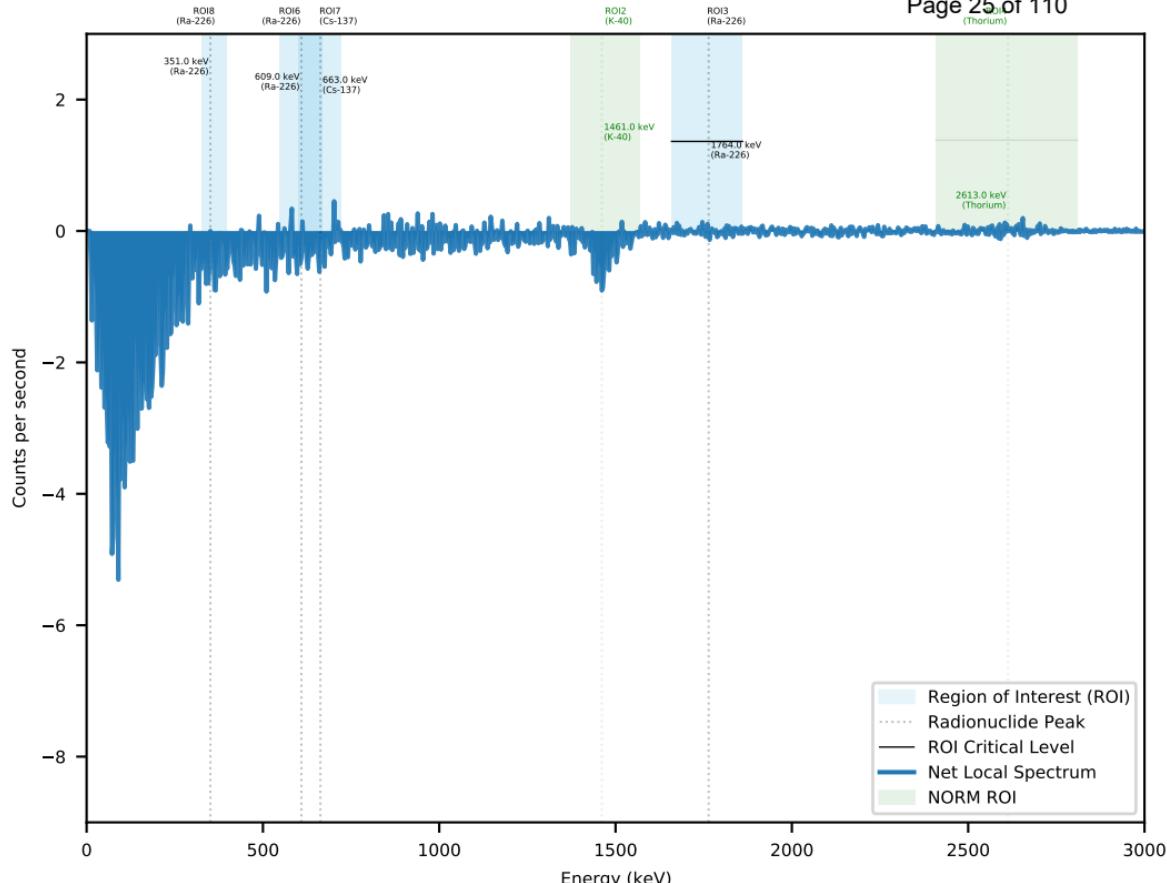
Net Gamma Spectrum, Static Location: 11

Page 24 of 110



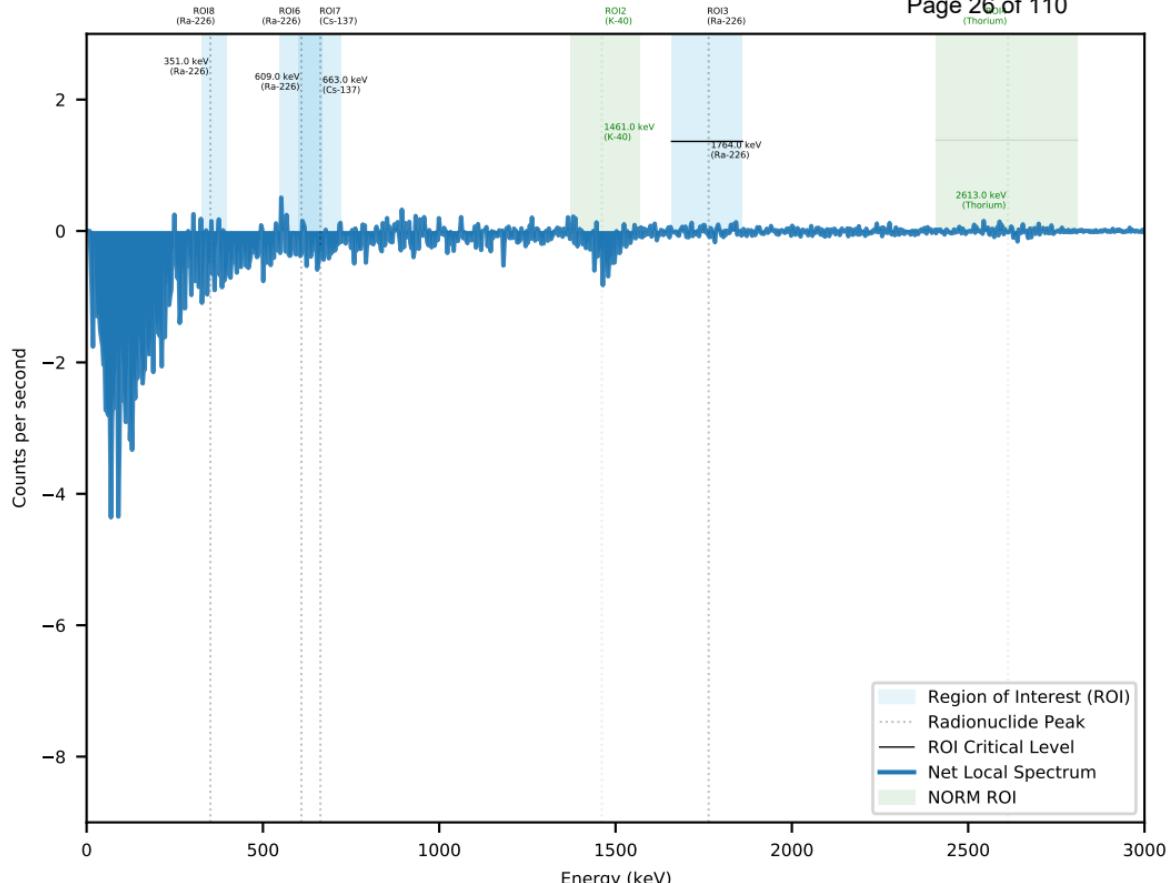
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Page 25 of 110
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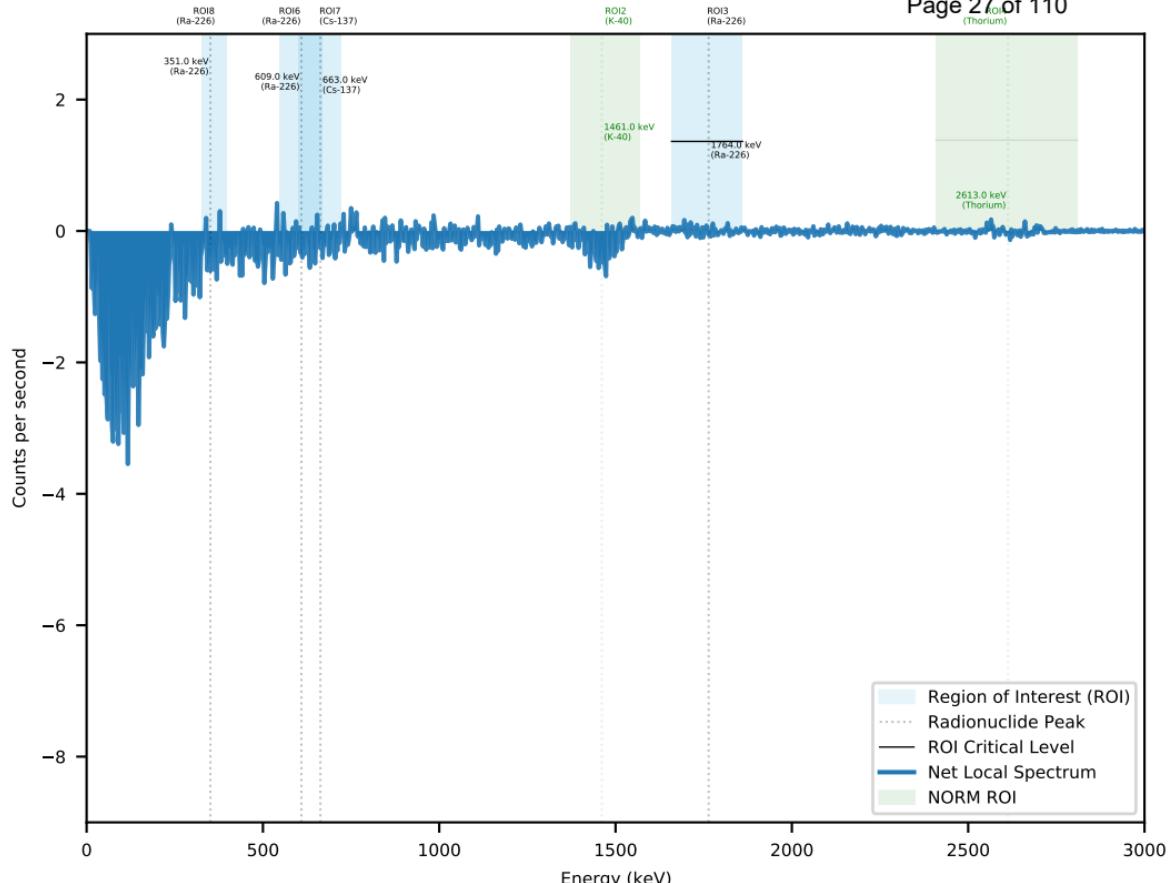
Net Gamma Spectrum, Static Location: 13

Page 26 of 110
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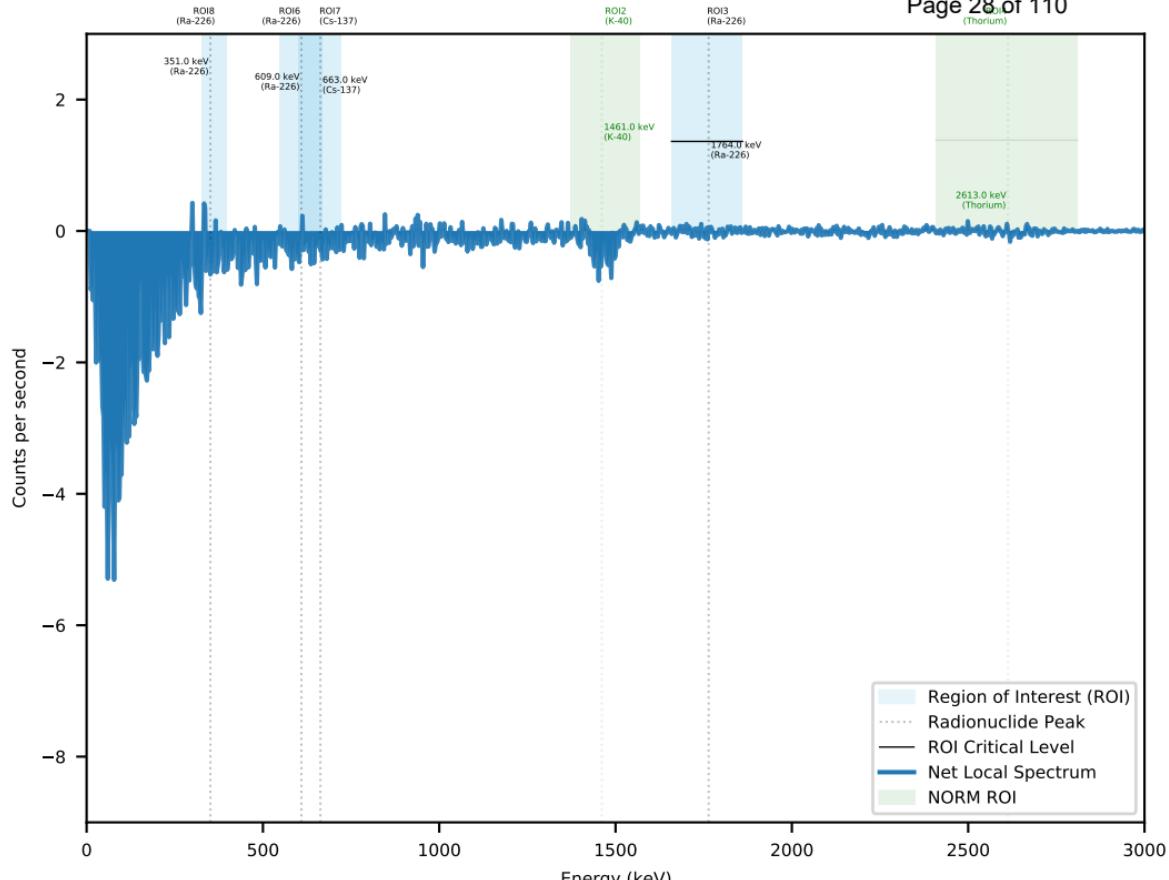
Net Gamma Spectrum, Static Location: 14

Page 27 of 110



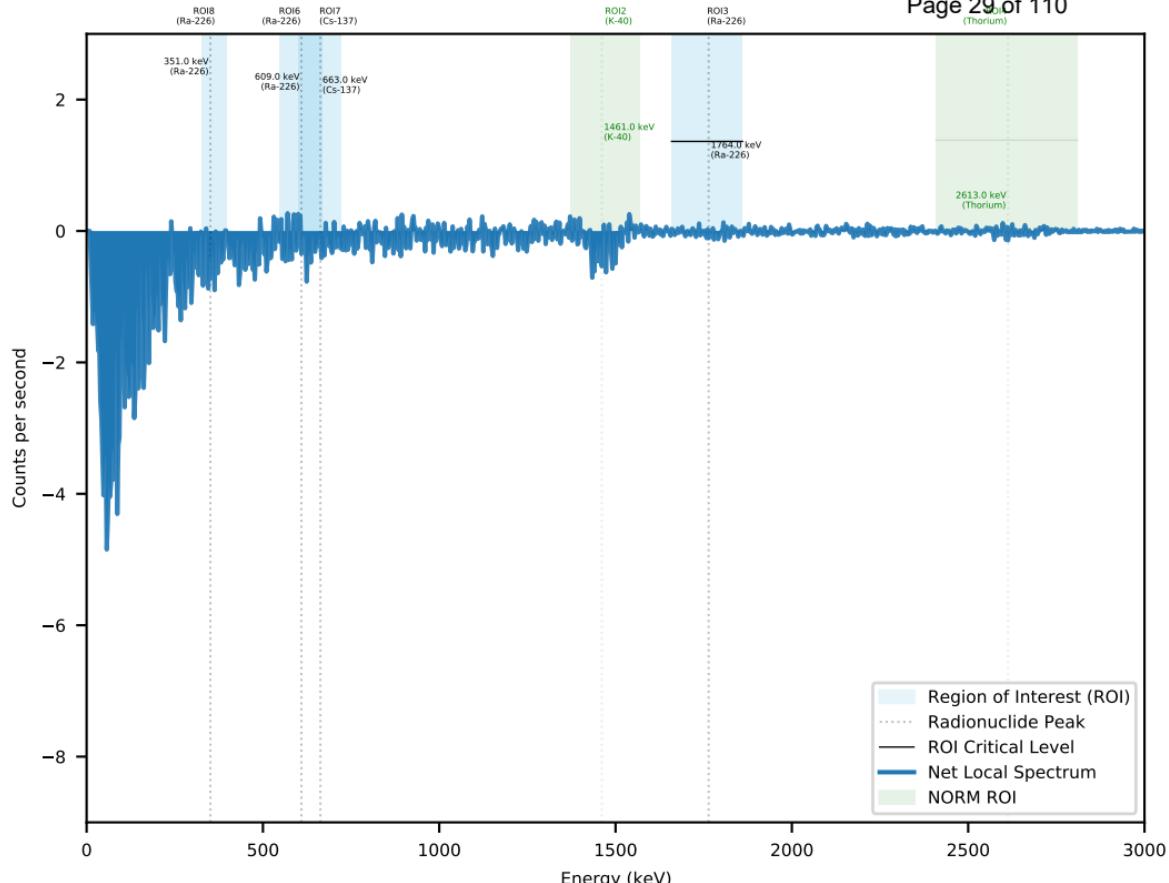
Net Gamma Spectrum, Static Location: 15

Page 28 of 110



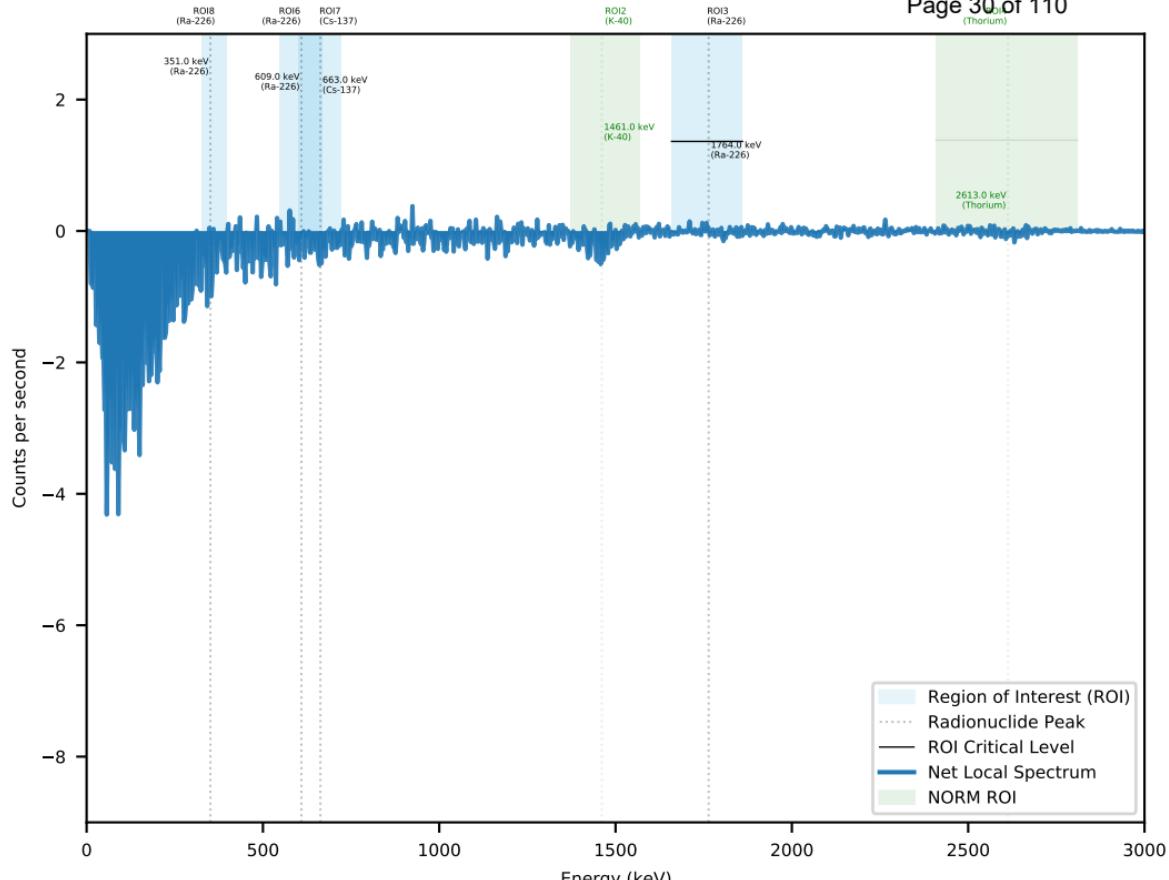
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Page 29 of 110



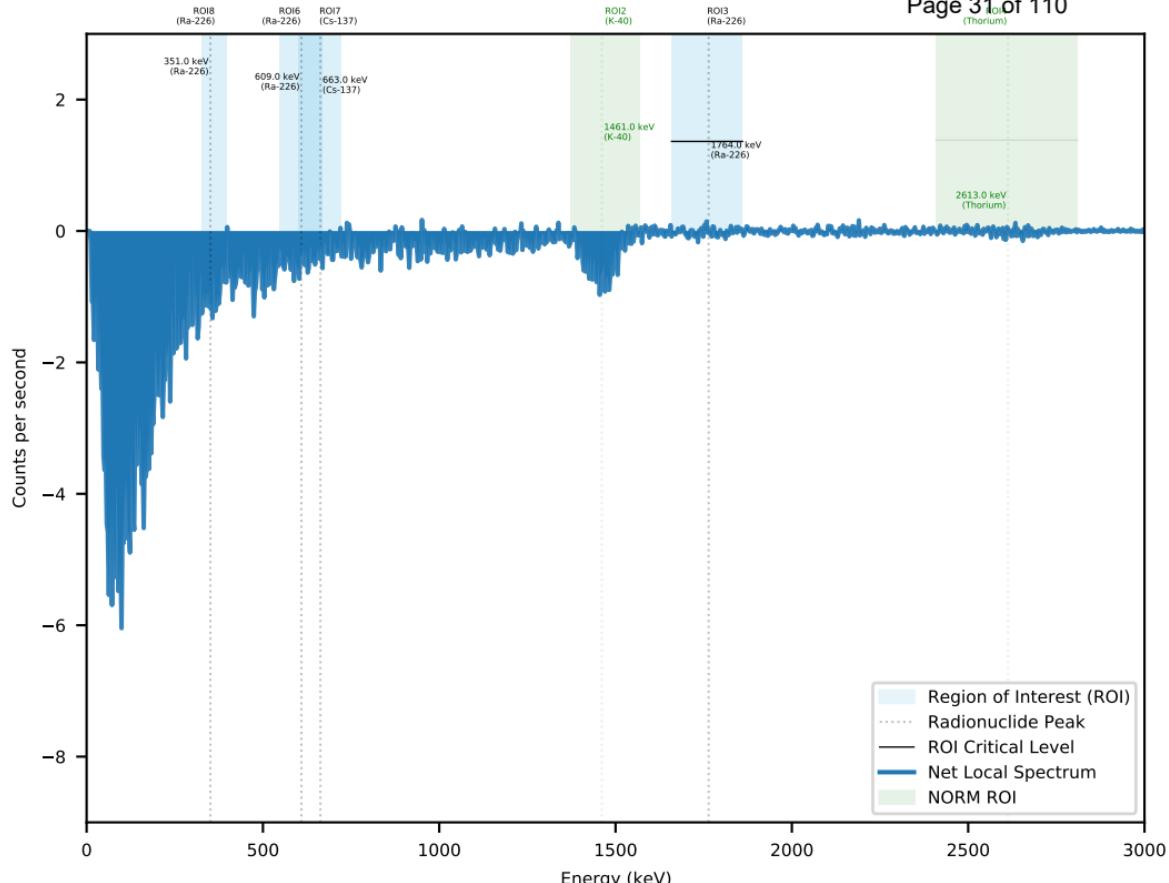
Net Gamma Spectrum, Static Location: 17

Page 30 of 110
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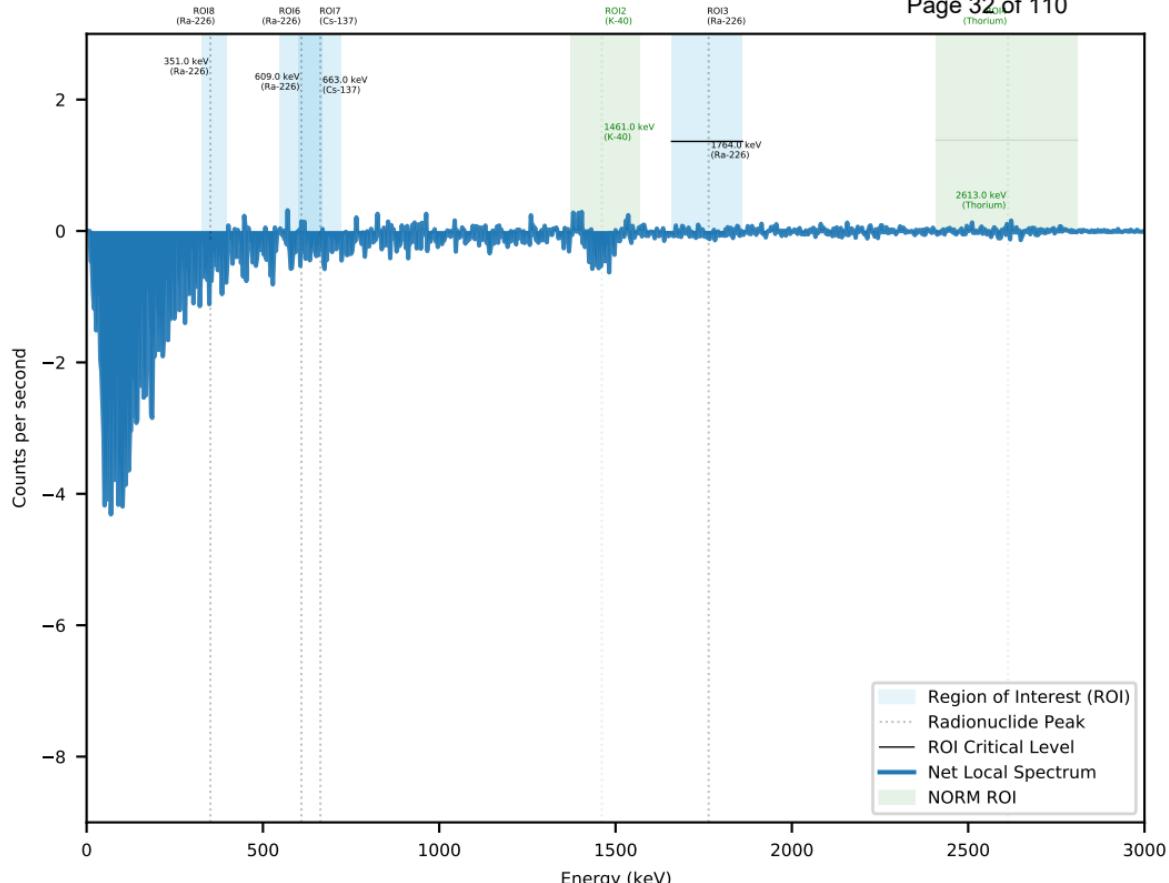
Net Gamma Spectrum, Static Location: 18

Page 31 of 110
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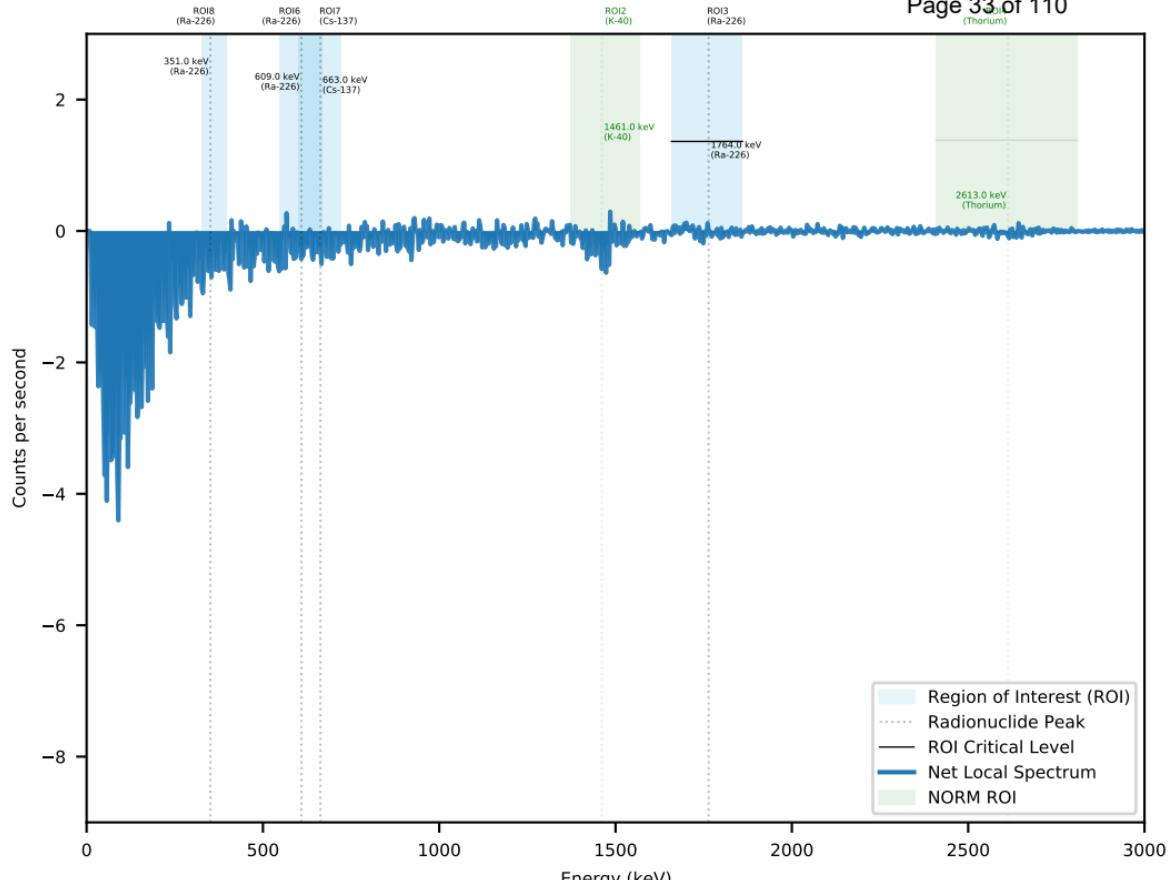
Net Gamma Spectrum, Static Location: 19

Page 32 of 110



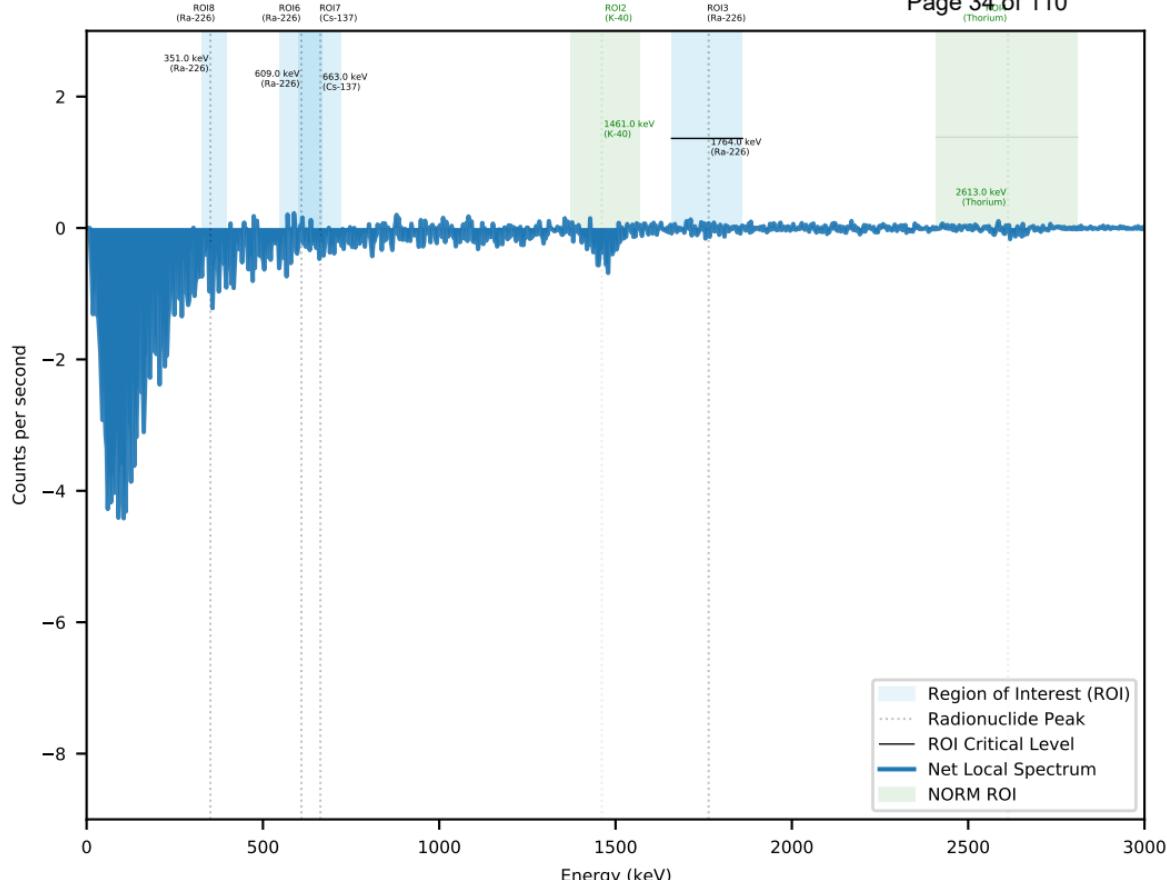
Net Gamma Spectrum, Static Location: 20

Page 33 of 110
 (Thorium)



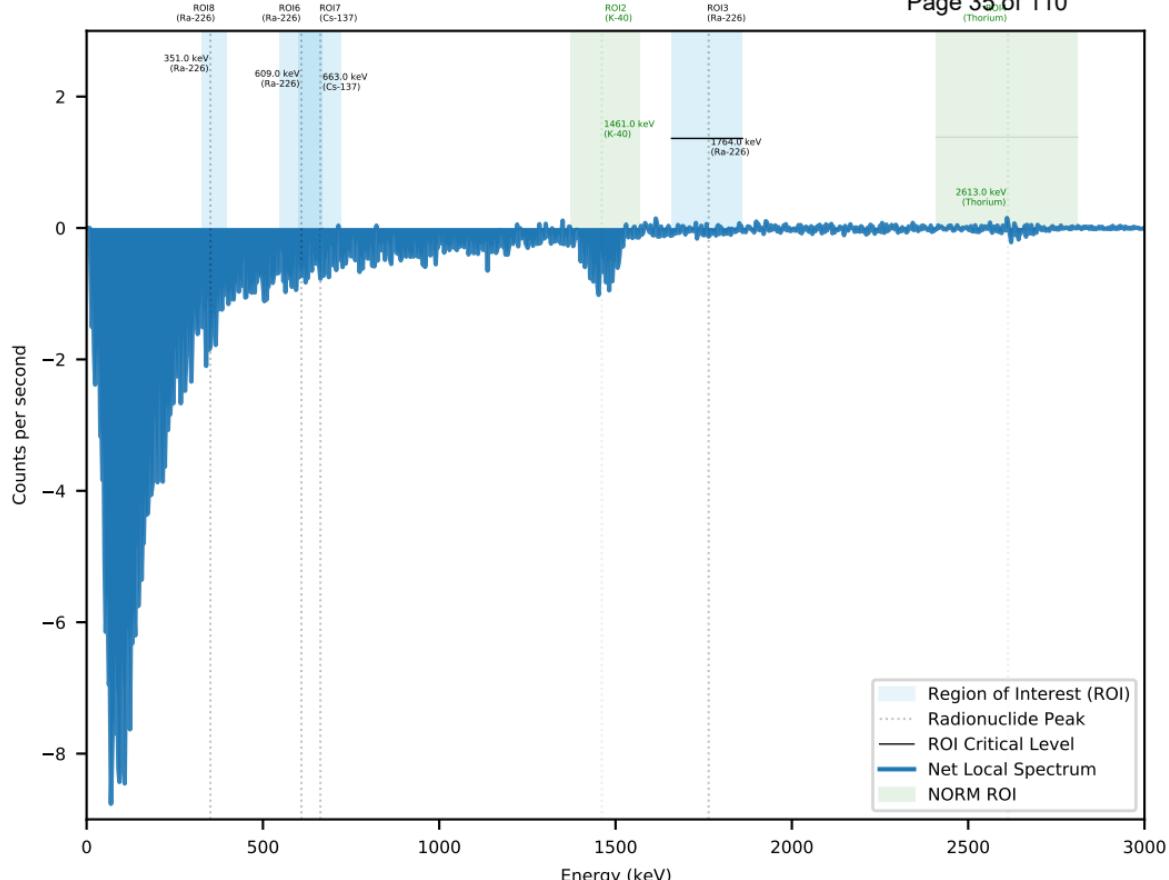
Net Gamma Spectrum, Static Location: 21

Page 34 of 110



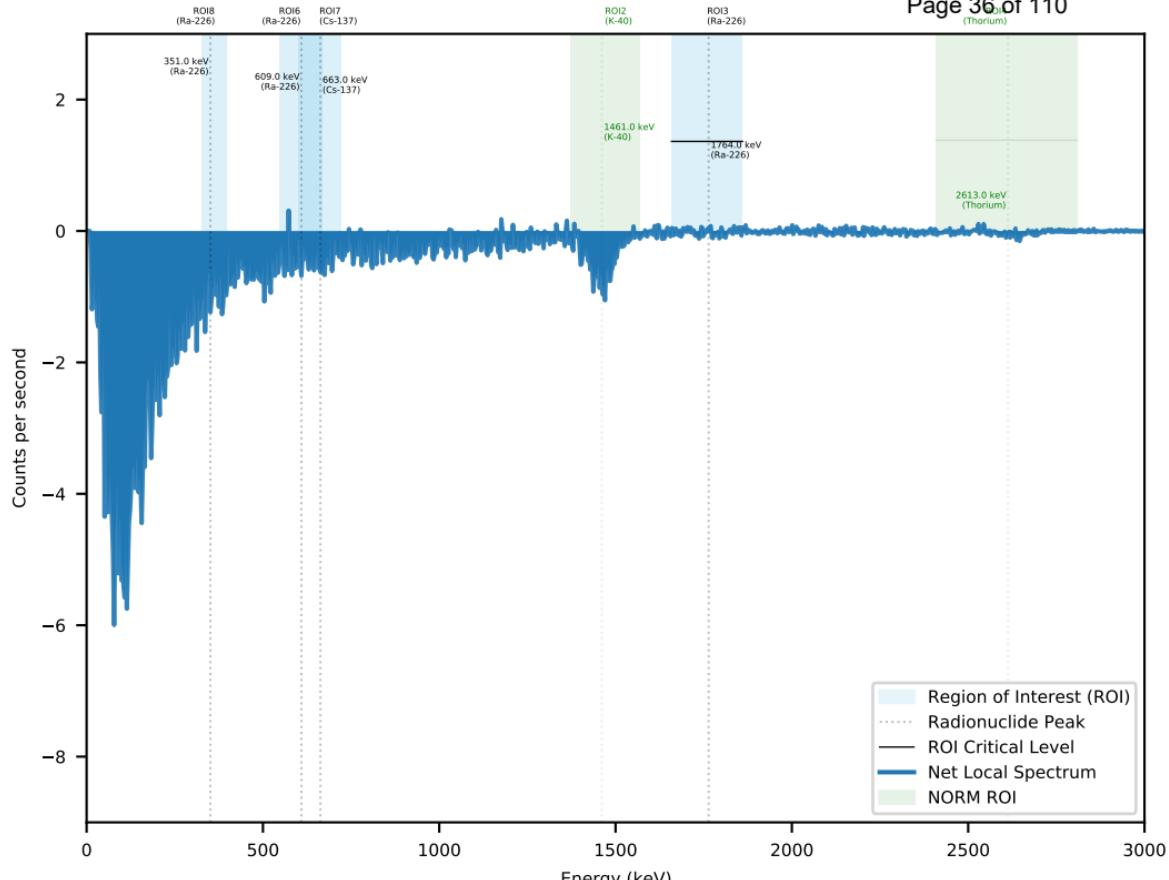
Net Gamma Spectrum, Static Location: 22

Page 35 of 110
 (Thorium)



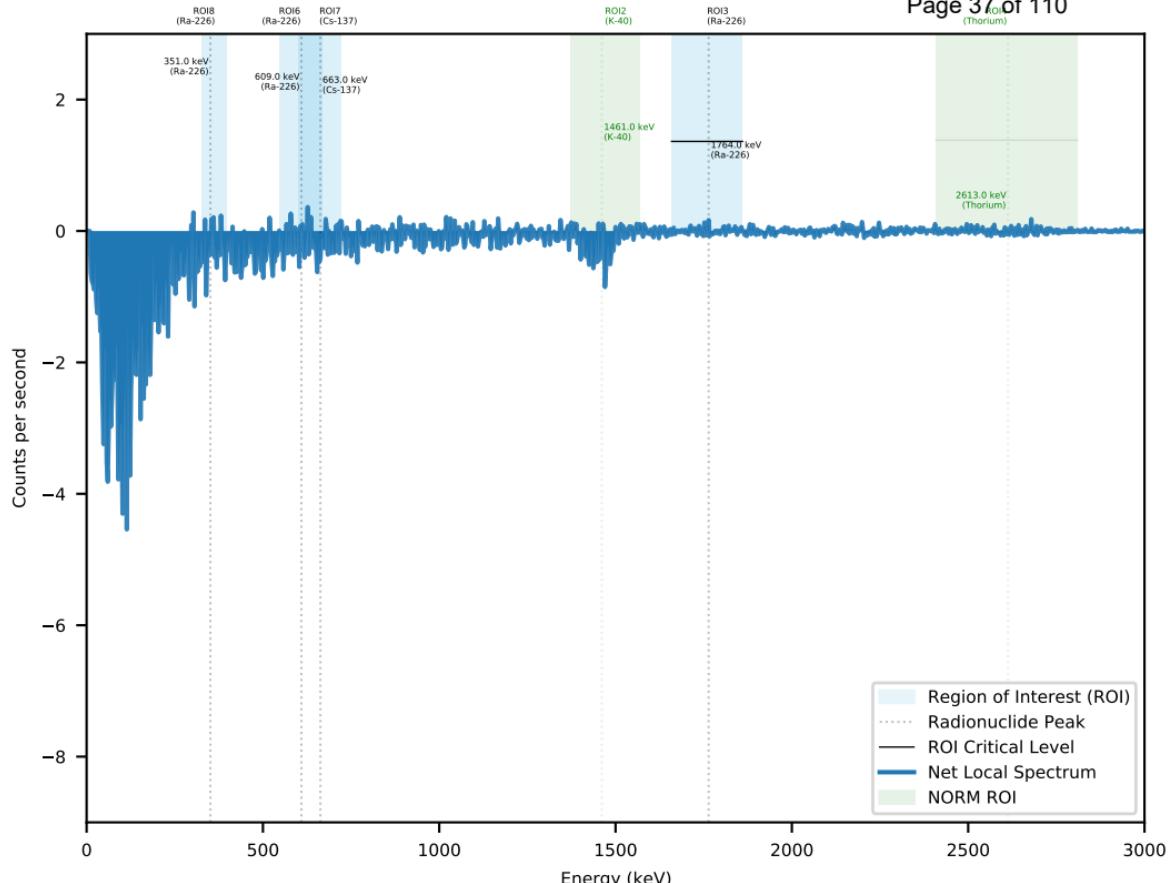
Net Gamma Spectrum, Static Location: 23

Page 36 of 110
 (Thorium)



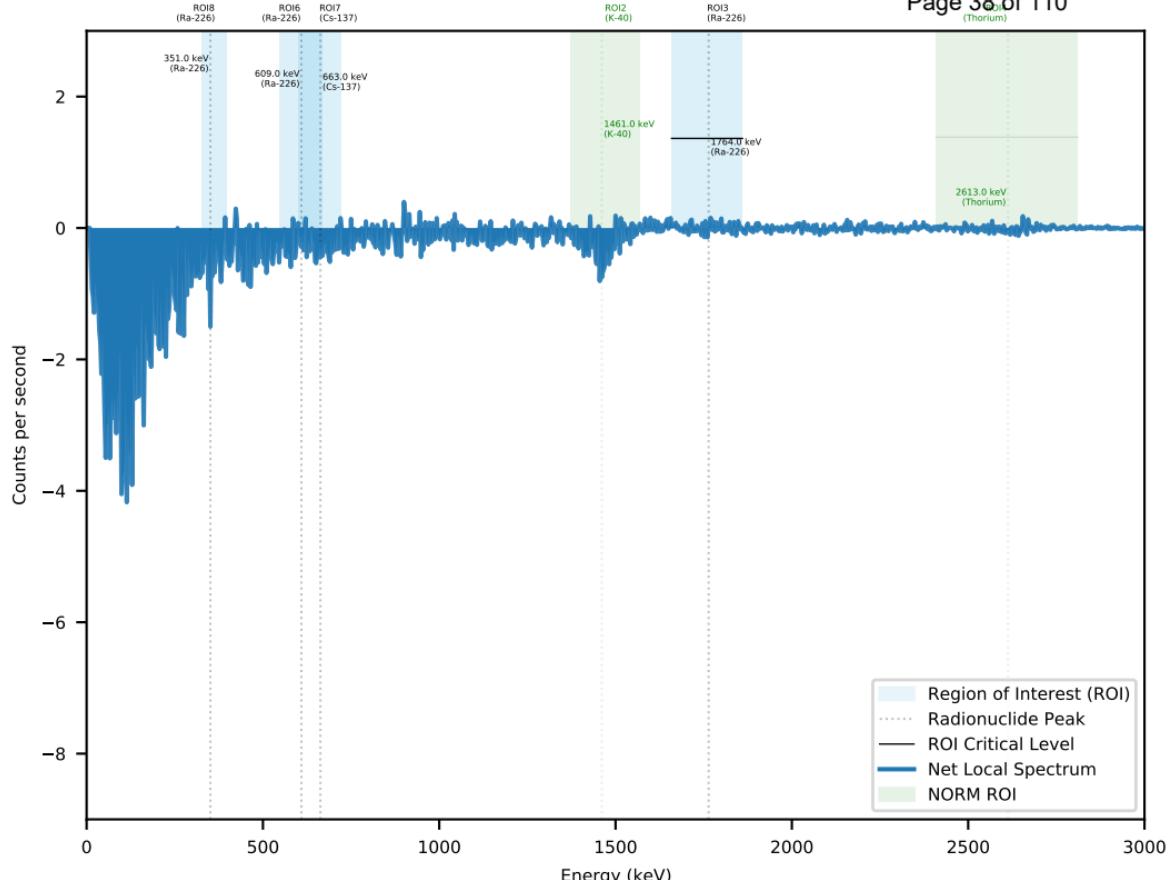
Net Gamma Spectrum, Static Location: 24

Page 37 of 110



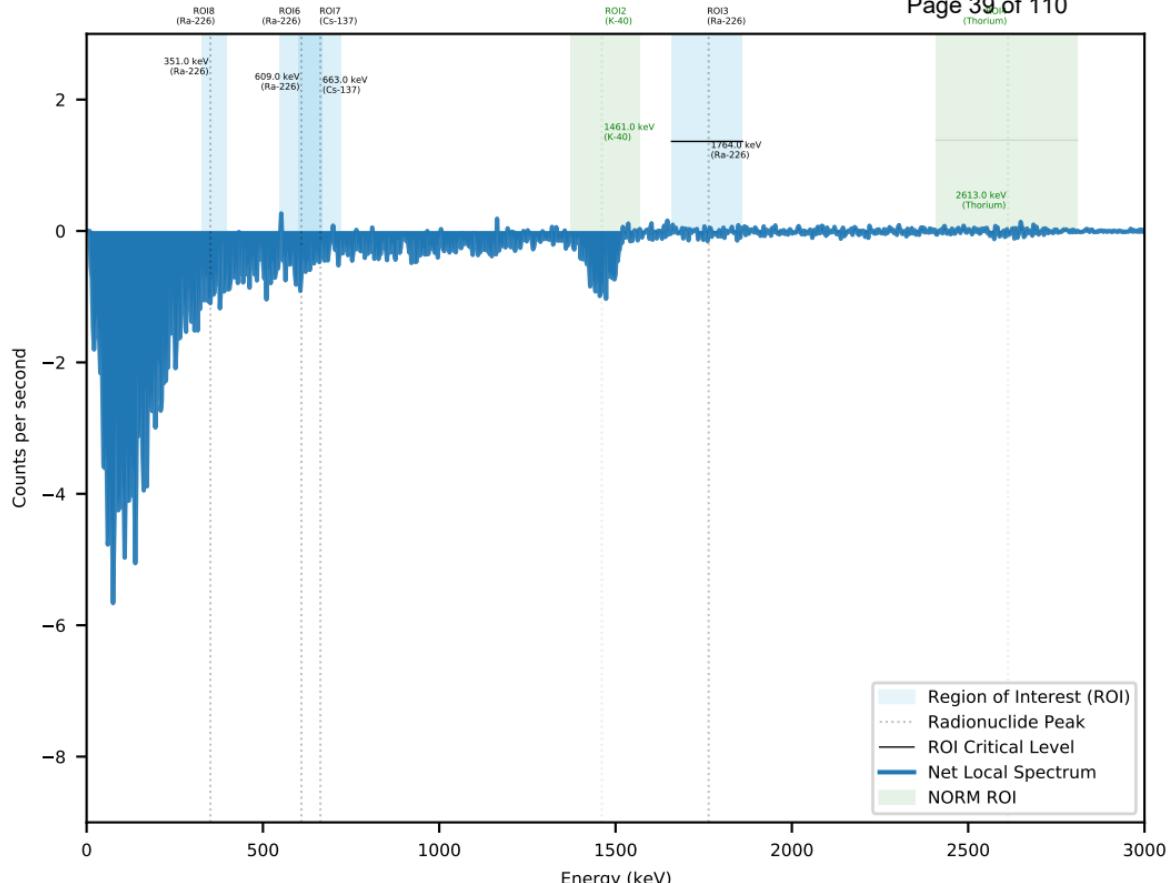
Net Gamma Spectrum, Static Location: 25

Page 38 of 110



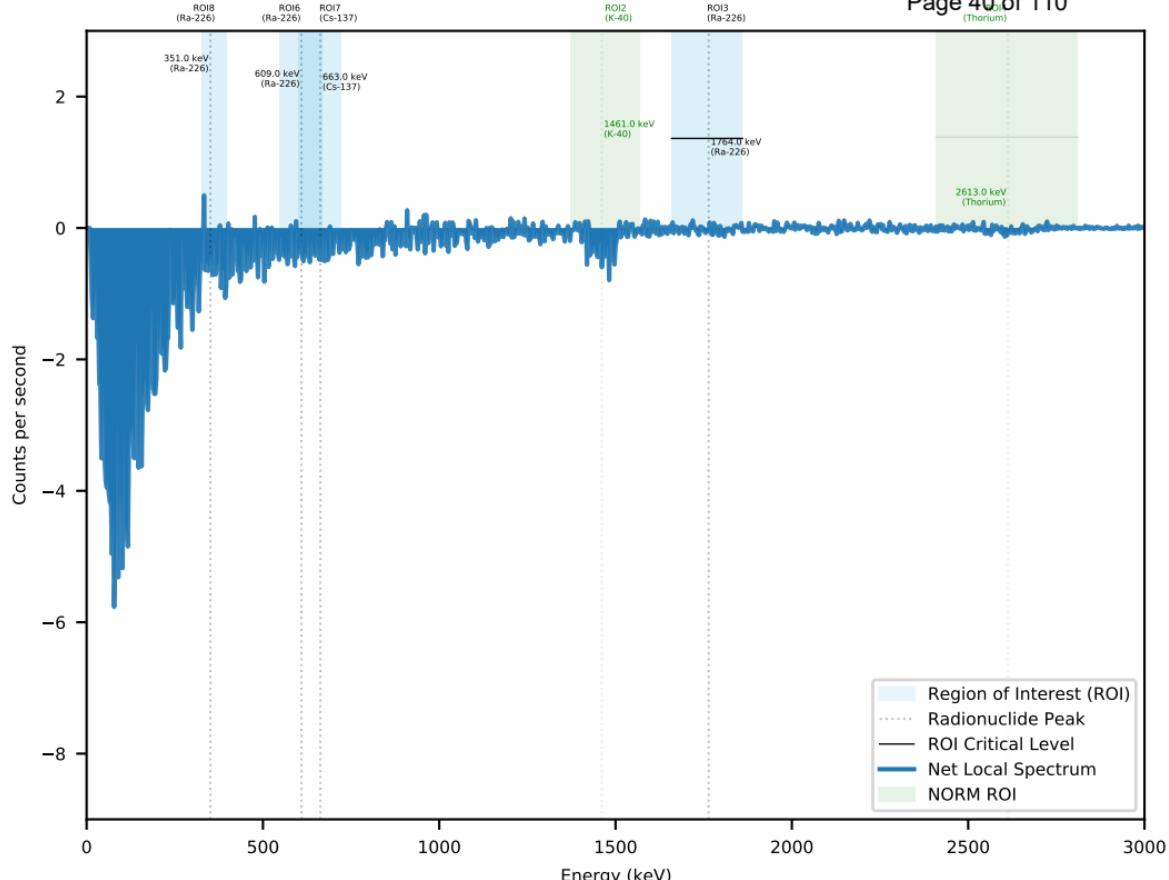
Net Gamma Spectrum, Static Location: 26

Page 39 of 110



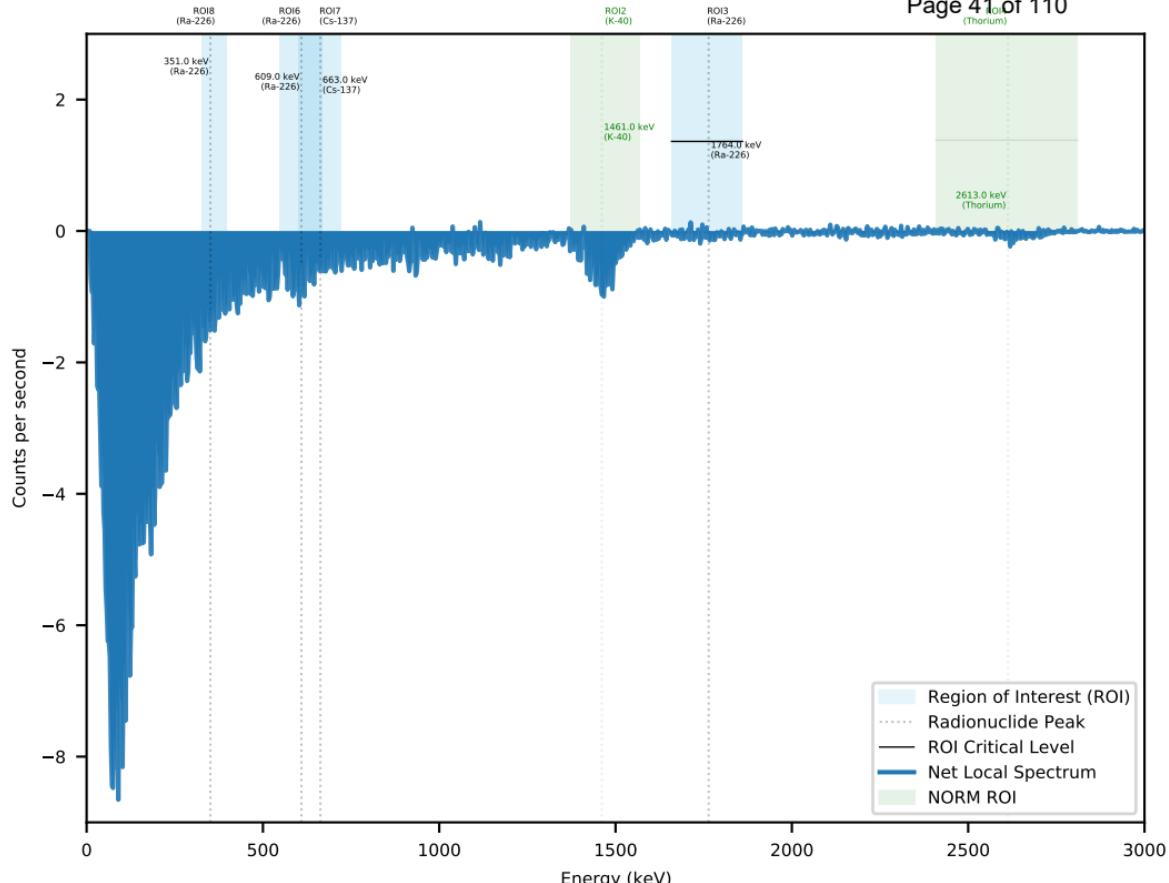
Net Gamma Spectrum, Static Location: 27

Page 40 of 110



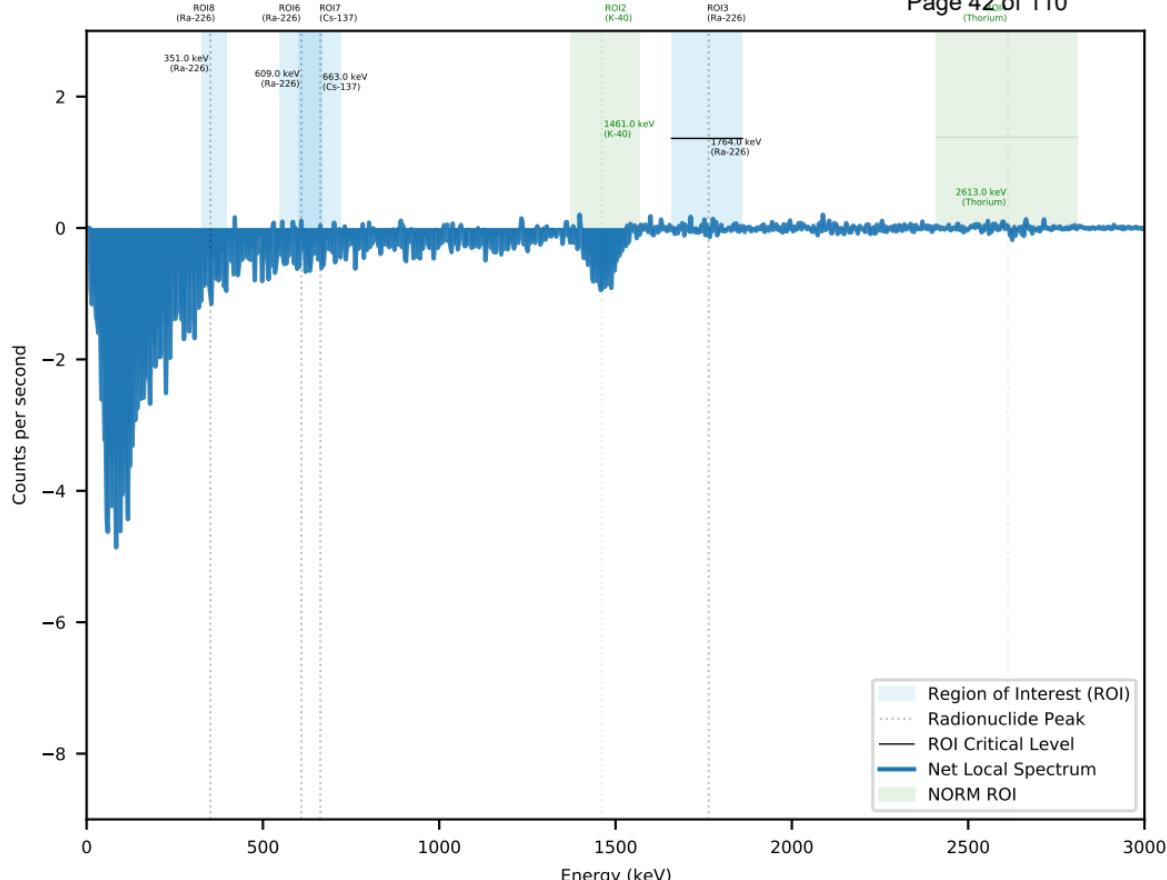
Net Gamma Spectrum, Static Location: 28

Page 41 of 110



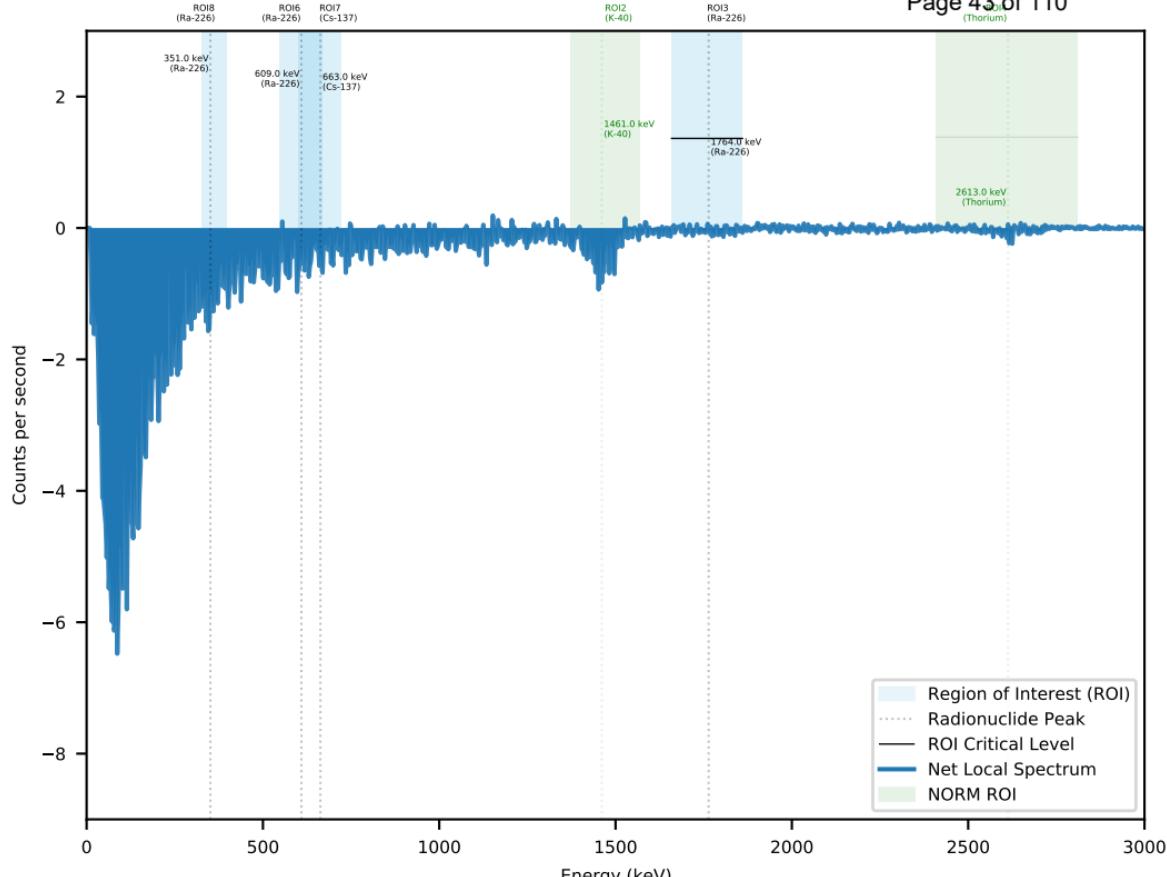
Net Gamma Spectrum, Static Location: 29

Page 42 of 110



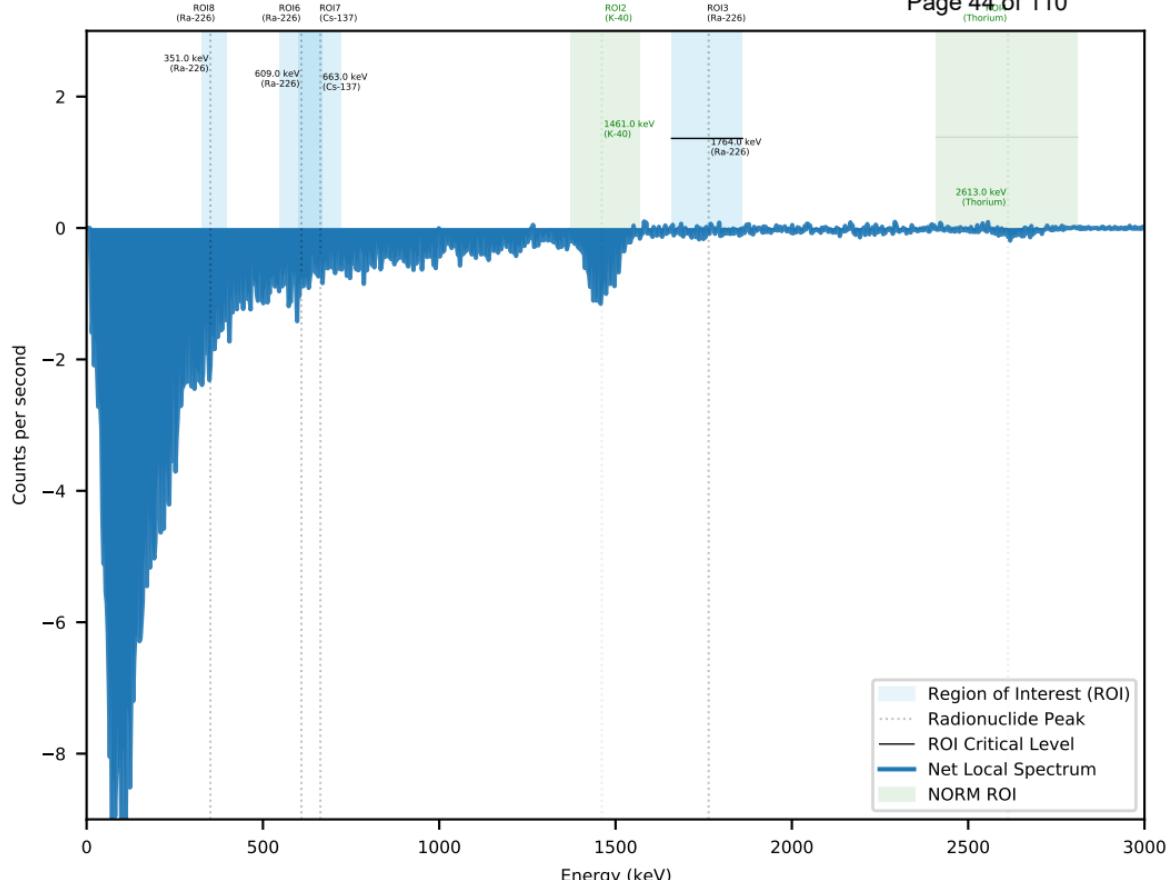
Net Gamma Spectrum, Static Location: 30

Page 43 of 110



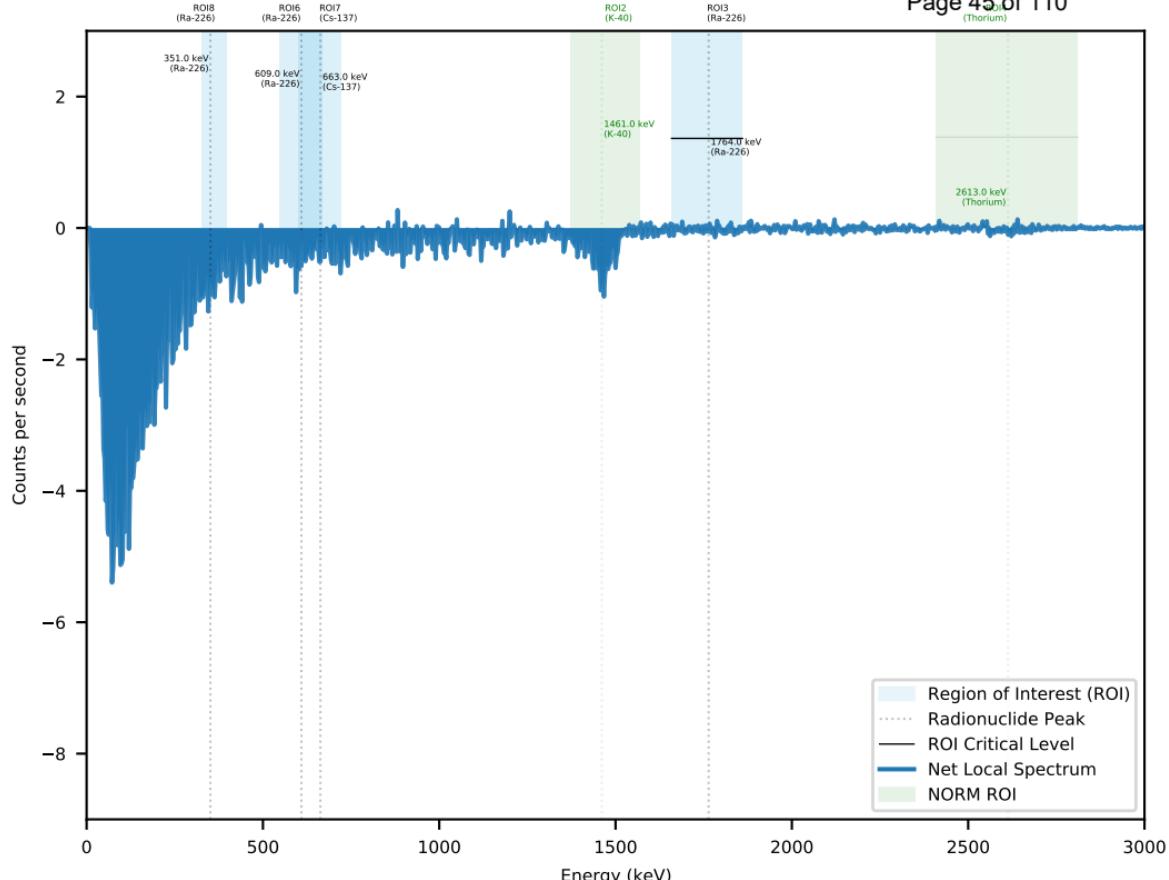
Net Gamma Spectrum, Static Location: 31

Page 44 of 110



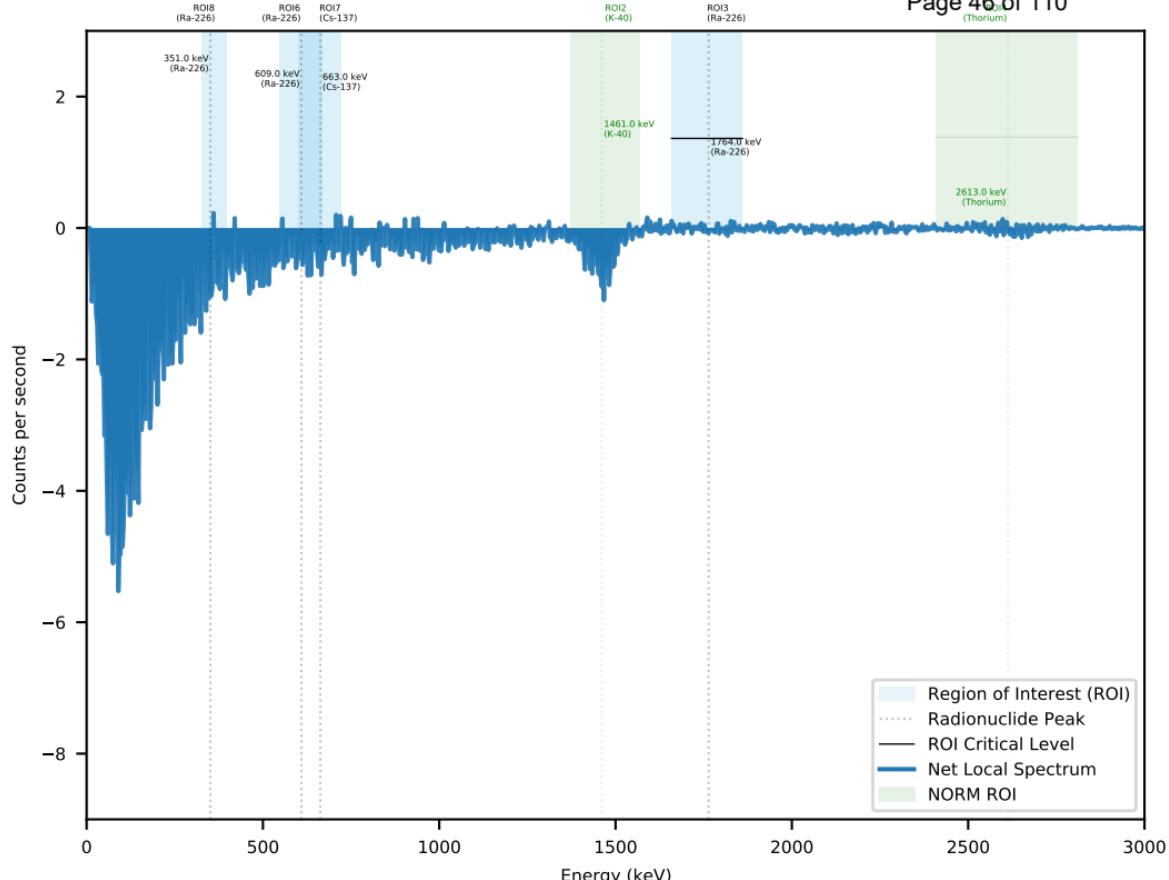
Net Gamma Spectrum, Static Location: 32

Page 45 of 110



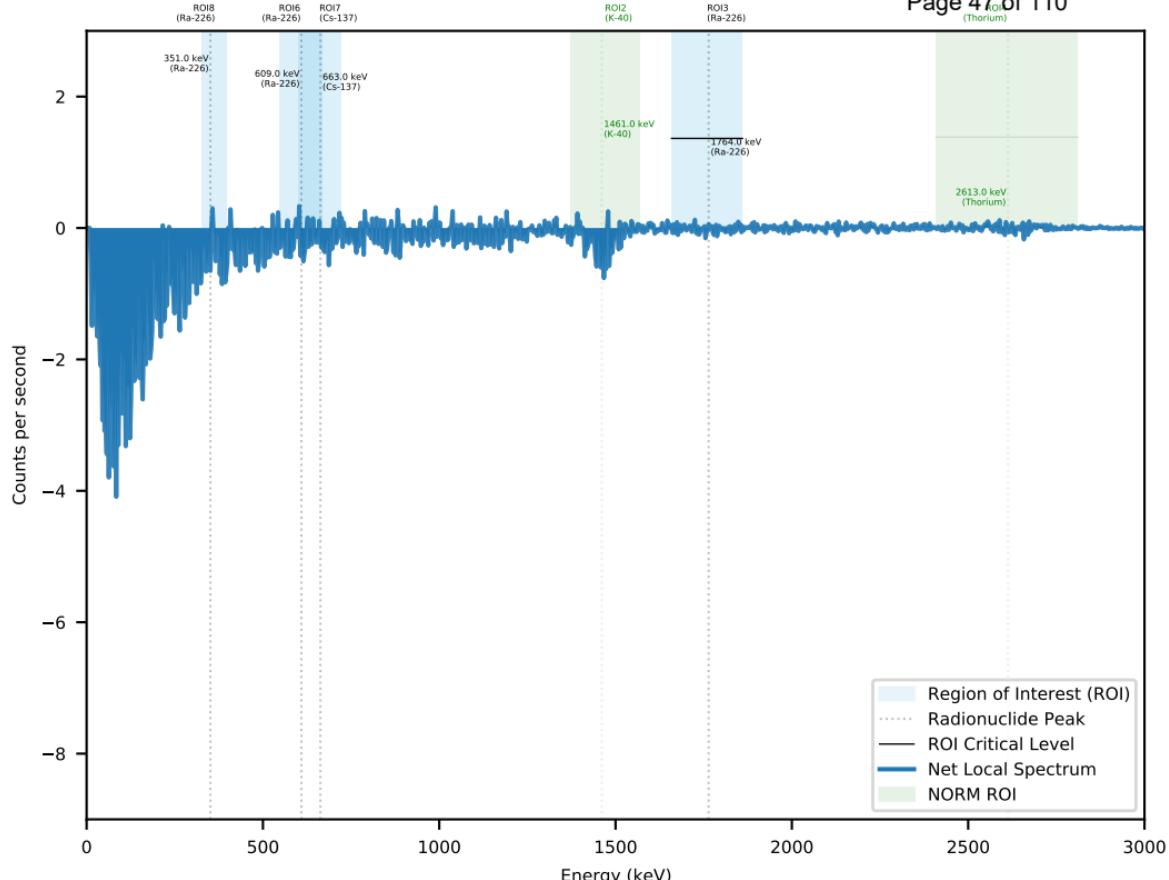
Net Gamma Spectrum, Static Location: 33

Page 46 of 110
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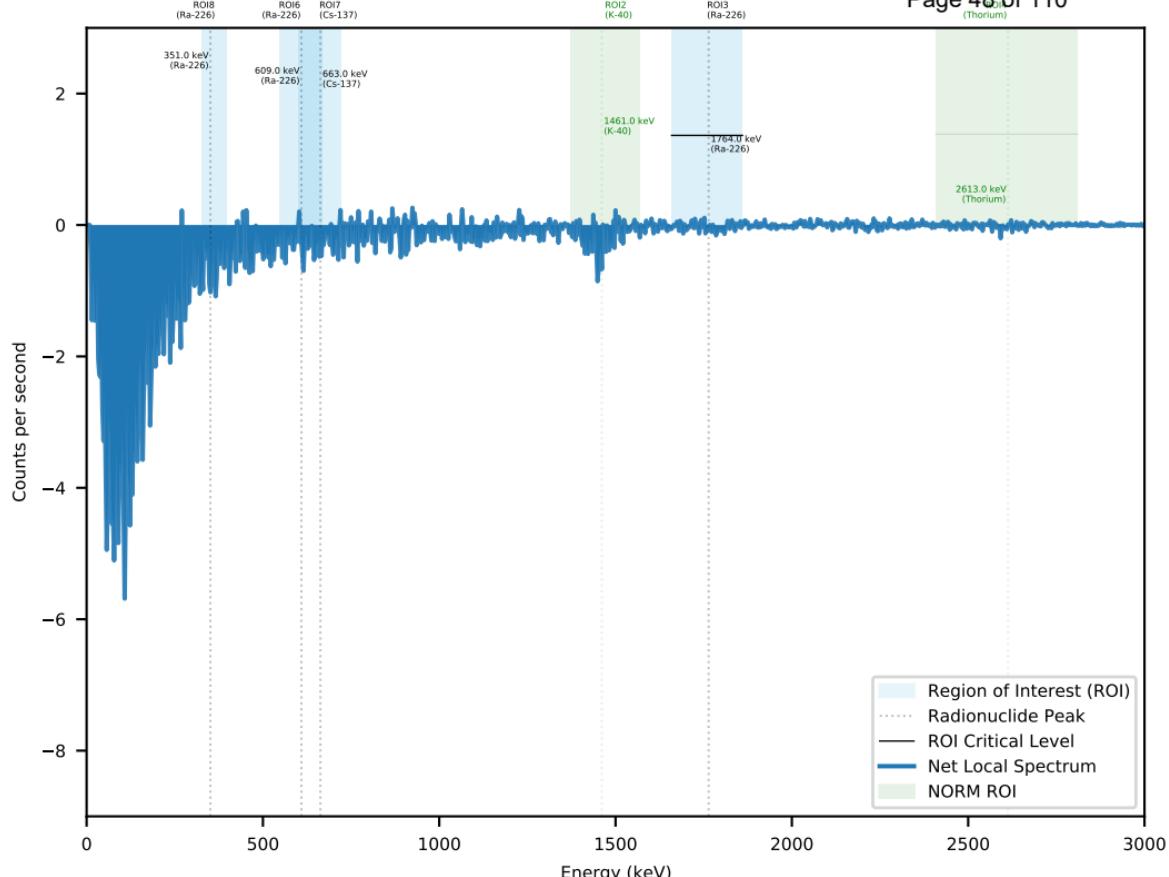
Net Gamma Spectrum, Static Location: 34

Page 47 of 110



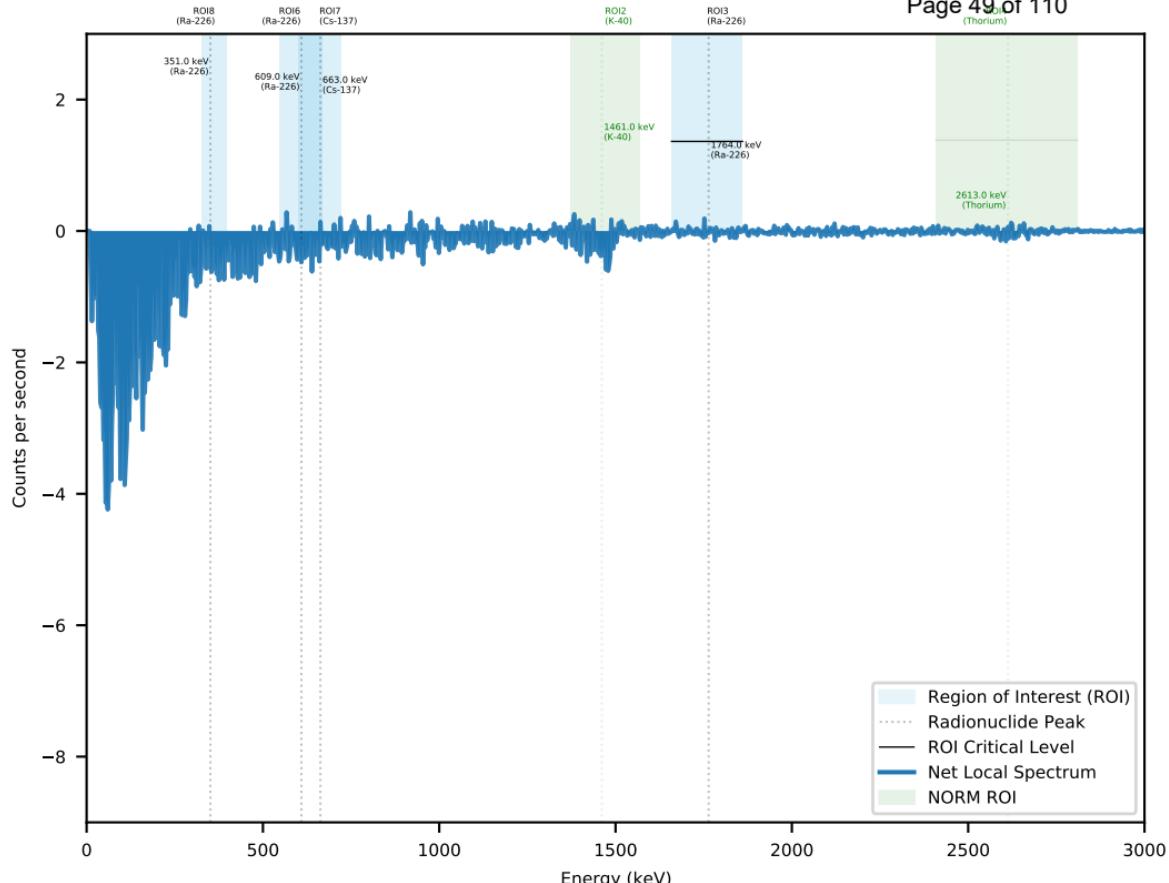
Net Gamma Spectrum, Static Location: 35

Page 48 of 110



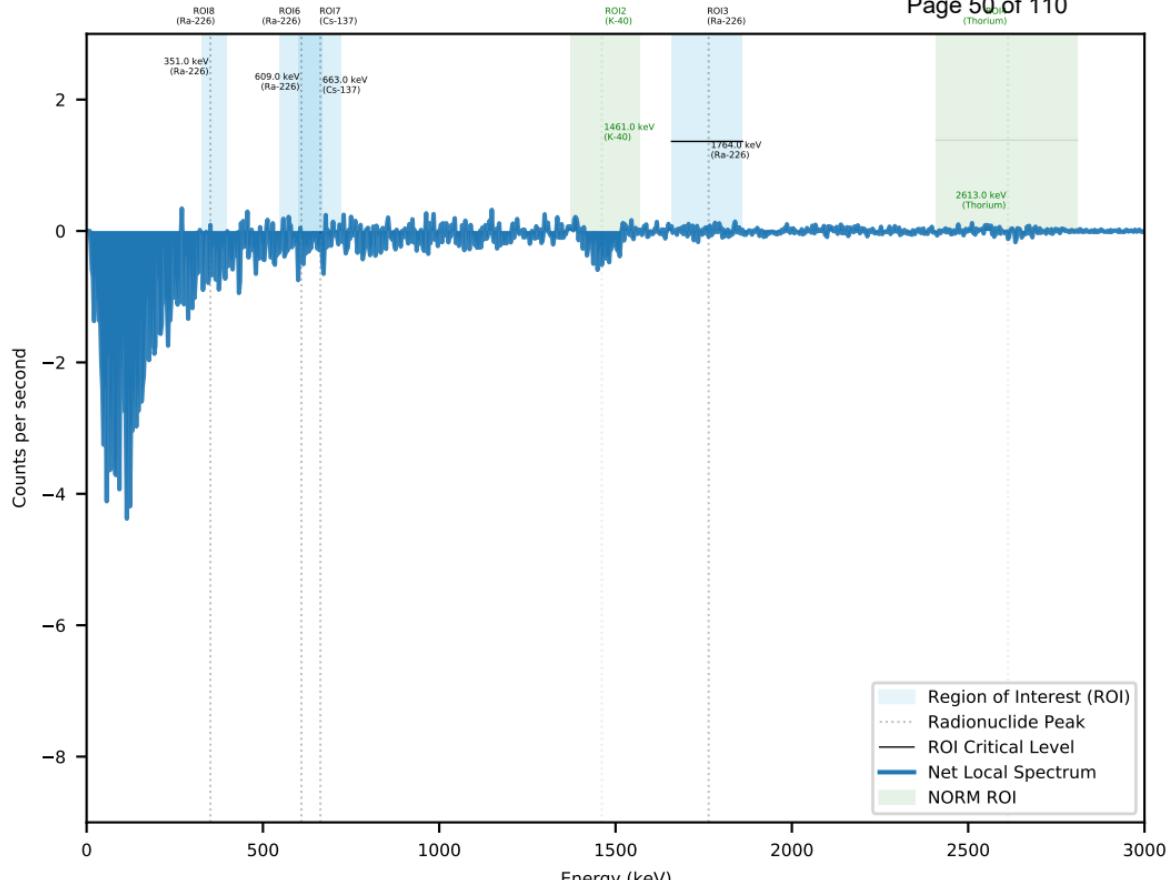
Net Gamma Spectrum, Static Location: 36

Page 49 of 110



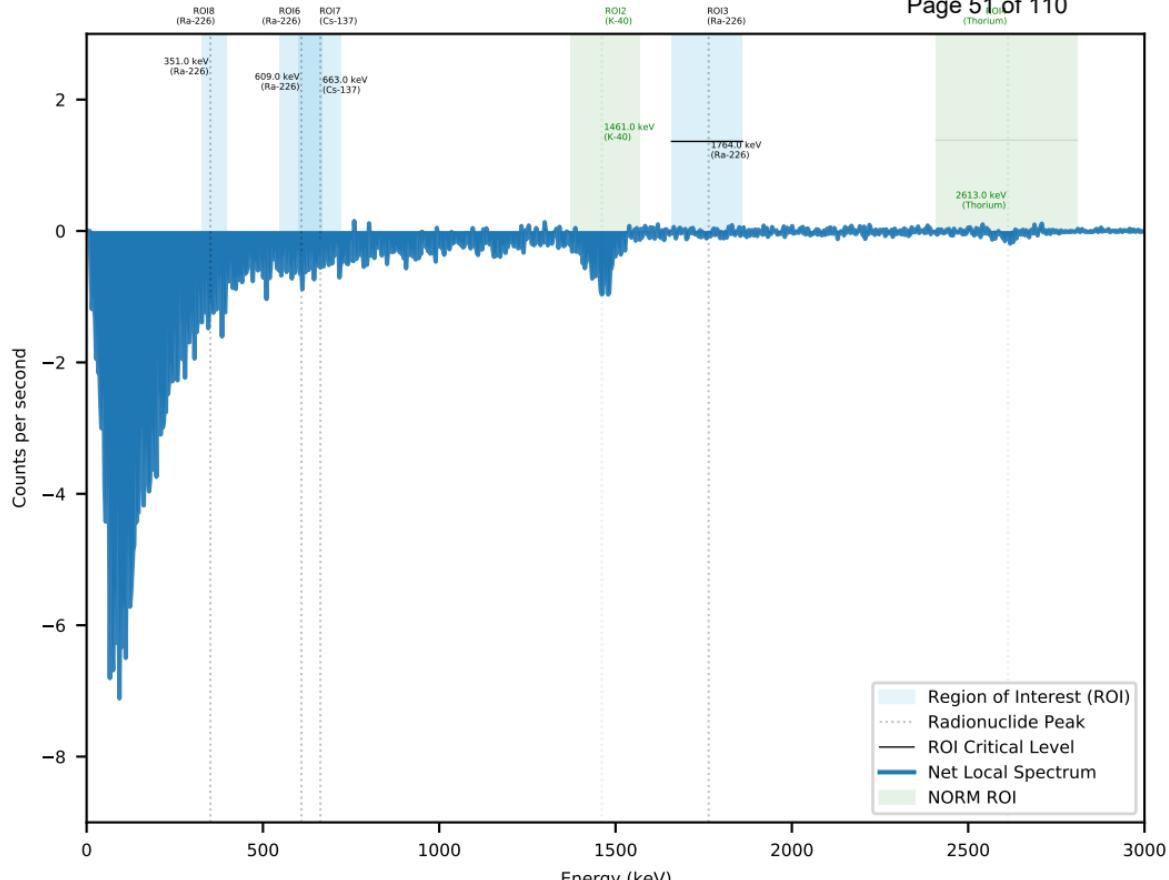
Net Gamma Spectrum, Static Location: 37

Page 50 of 110



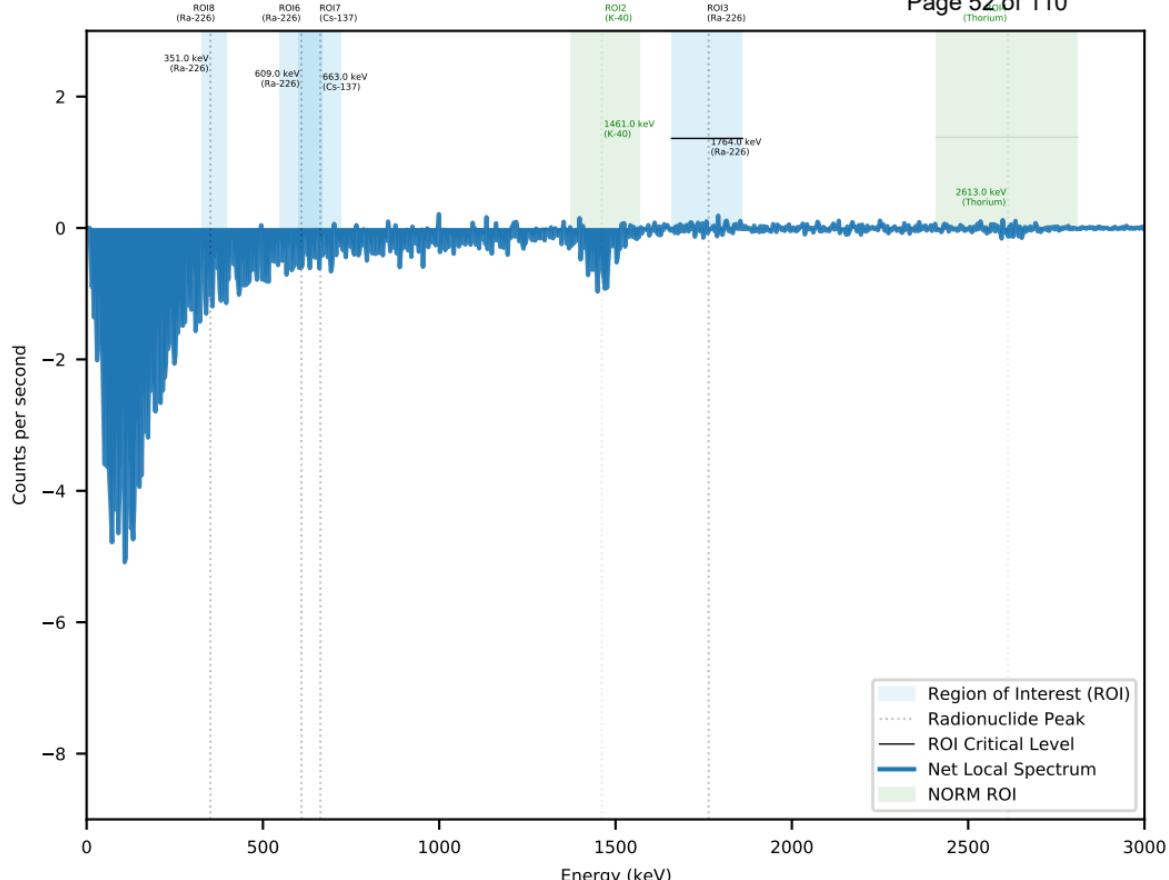
Net Gamma Spectrum, Static Location: 38

Page 51 of 110
 (Thorium)



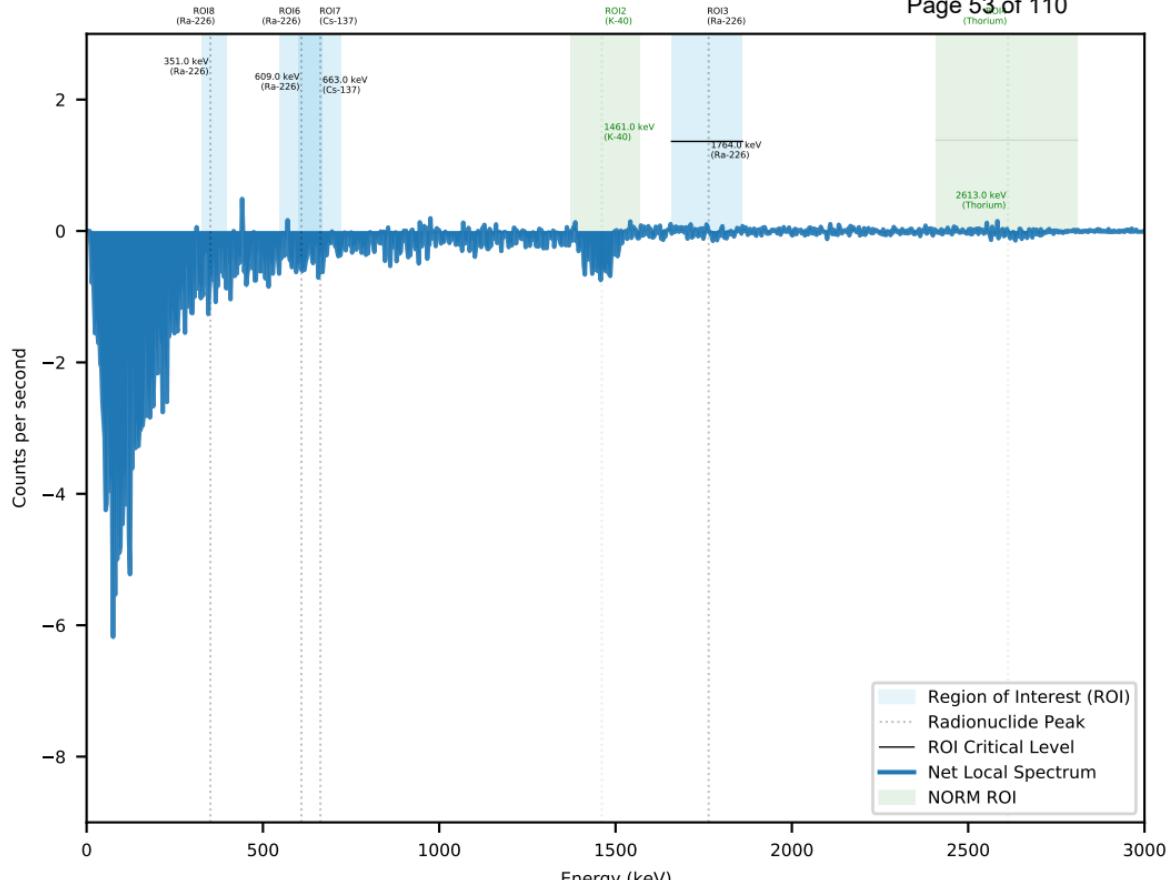
Net Gamma Spectrum, Static Location: 39

Page 52 of 110



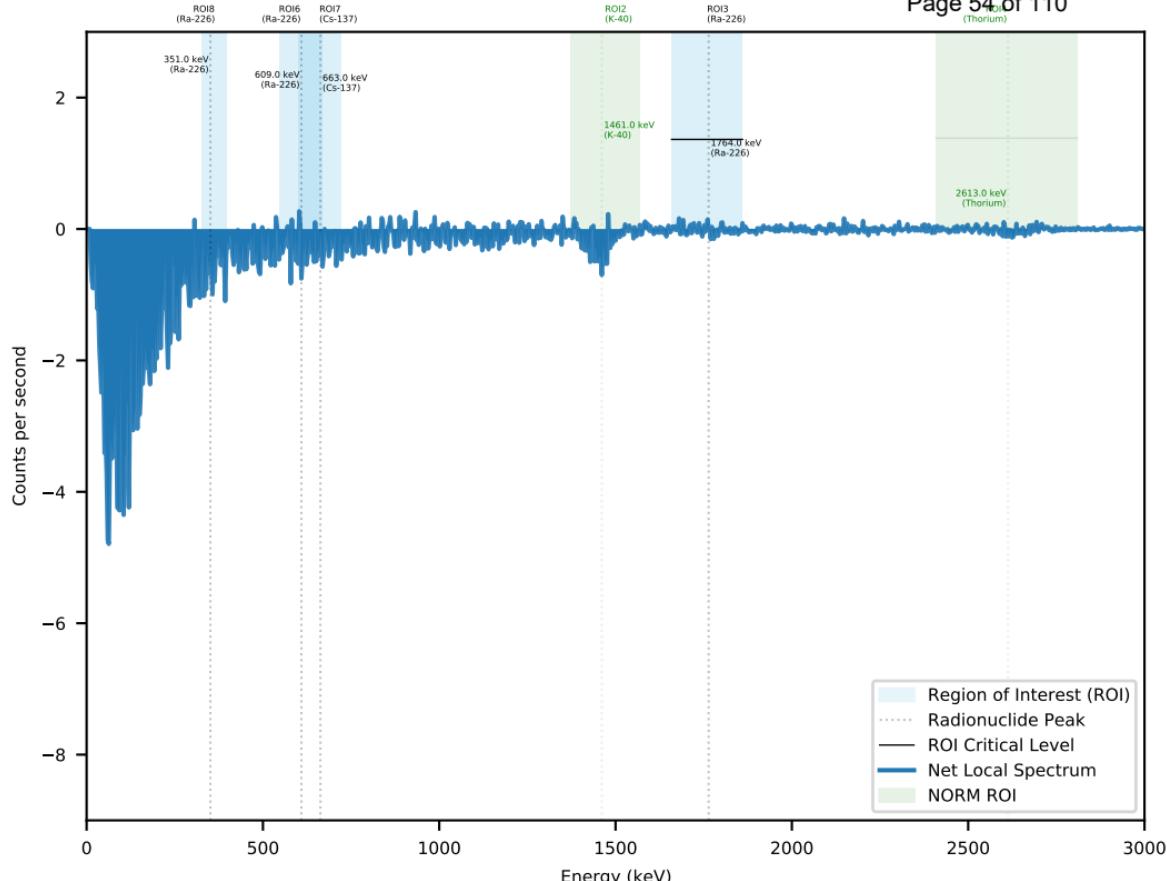
Net Gamma Spectrum, Static Location: 40

Page 53 of 110
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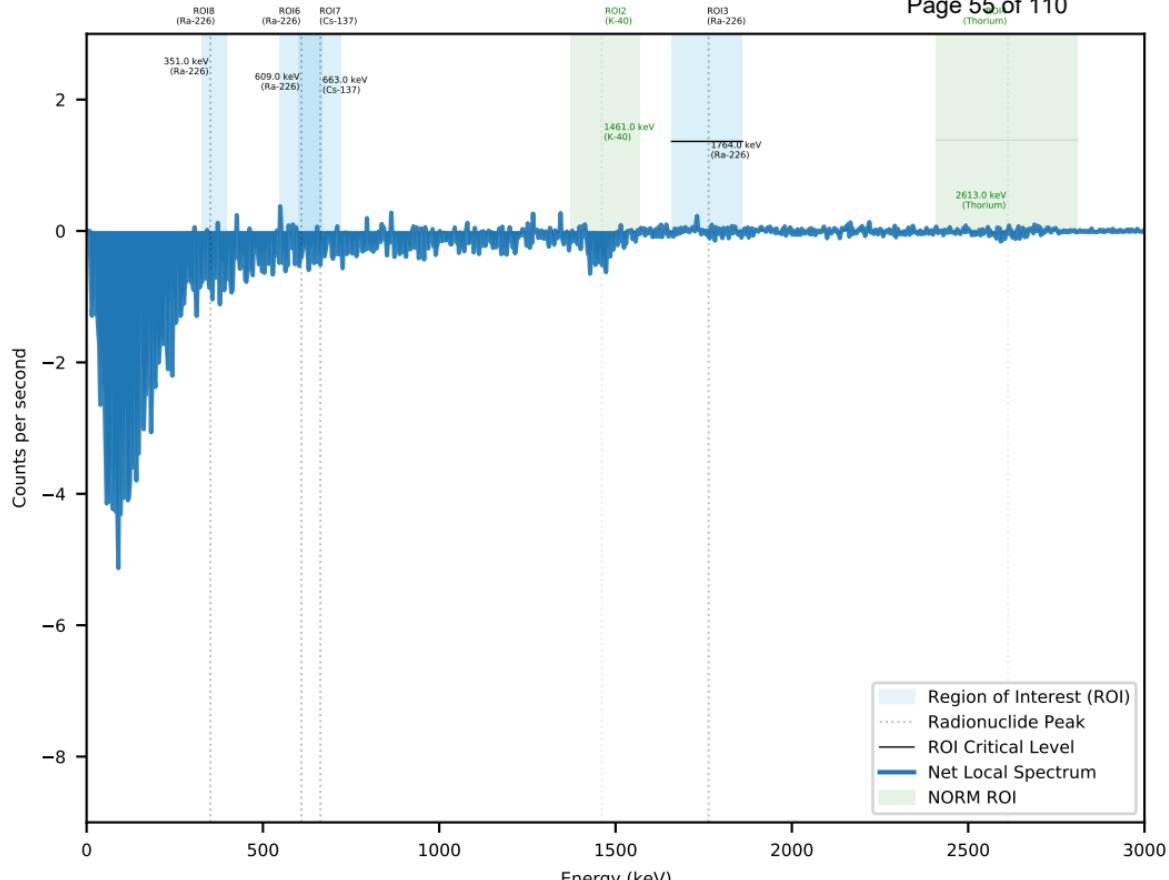
Net Gamma Spectrum, Static Location: 41

Page 54 of 110



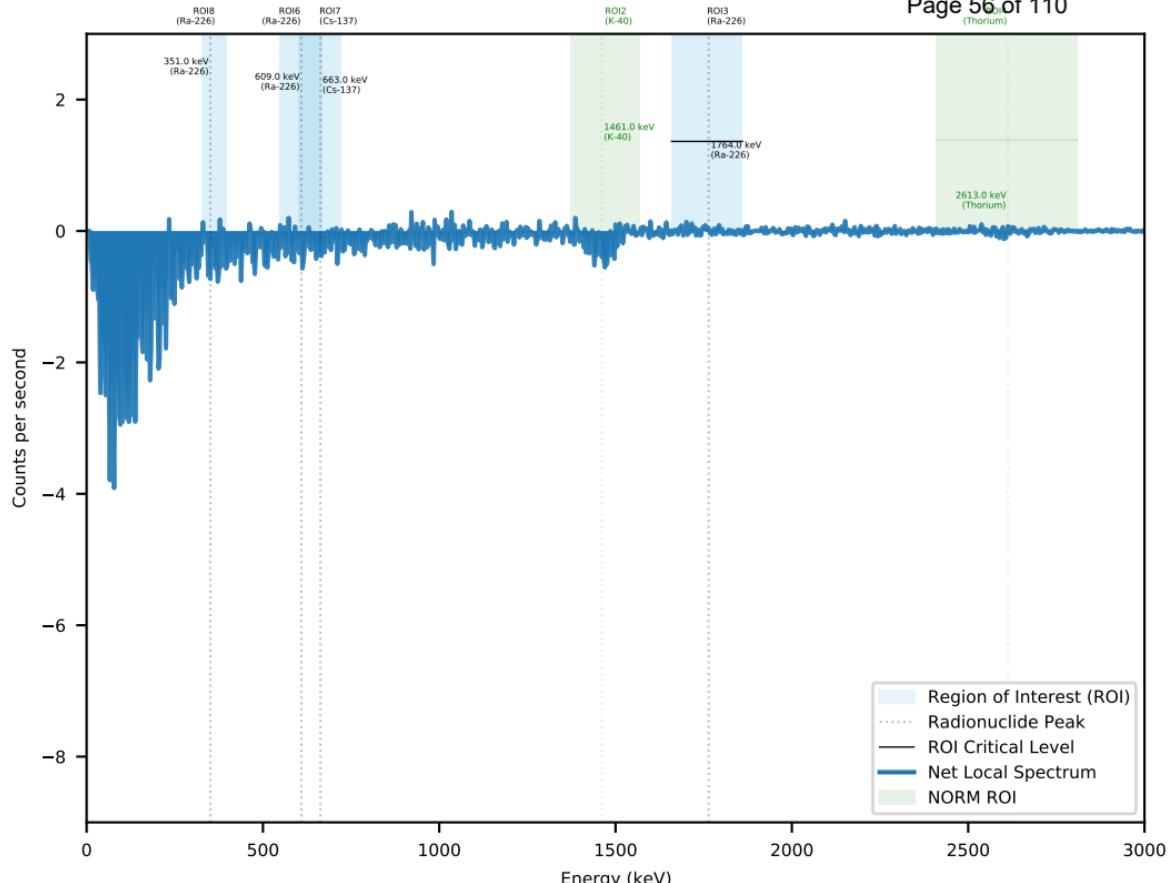
Net Gamma Spectrum, Static Location: 42

Page 55 of 110
 (Thorium)



Net Gamma Spectrum, Static Location: 43

Page 56 of 110
 (Thorium)





Environment Testing America



ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

[Laboratory Job ID: 160-40423-1](#)
Laboratory Sample Delivery Group: GJ46599771
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/13/2021 4:42:04 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	7
Receipt Checklists	11
Definitions/Glossary	12
Method Summary	13
Sample Summary	14
Client Sample Results	15
QC Sample Results	31
QC Association Summary	37
Tracer Carrier Summary	39

Case Narrative

Page 59 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Job ID: 160-40423-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40423-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/17/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 60 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Job ID: 160-40423-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 12.3 C.

STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU077A-001 (160-40423-1), HPPG-ESU-TU077A-011 (160-40423-11), HPPG-ESU-TU077A-021 (160-40423-21) and HPPG-F-033 (160-40423-26) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/18/2020, prepared on 12/16/2020 and 12/29/2020 and analyzed on 01/04/2021 and 01/07/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:
HPPG-ESU-TU077A-021 (160-40423-21) and HPPG-F-033 (160-40423-26). The samples contained small rocks.

Strontium 90 prep batch 493370

The method blank (MB) z-score is within limits and is stored in the level IV raw data. (MB 160-493370/23-A)

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix:
HPPG-ESU-TU077A-001 (160-40423-1) and HPPG-ESU-TU077A-011 (160-40423-11). The samples contained small rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU077A-001 (160-40423-1), HPPG-ESU-TU077A-002 (160-40423-2), HPPG-ESU-TU077A-003 (160-40423-3), HPPG-ESU-TU077A-004 (160-40423-4), HPPG-ESU-TU077A-005 (160-40423-5), HPPG-ESU-TU077A-006 (160-40423-6), HPPG-ESU-TU077A-007 (160-40423-7), HPPG-ESU-TU077A-008 (160-40423-8), HPPG-ESU-TU077A-009 (160-40423-9), HPPG-ESU-TU077A-010 (160-40423-10), HPPG-ESU-TU077A-011 (160-40423-11), HPPG-ESU-TU077A-012 (160-40423-12), HPPG-ESU-TU077A-013 (160-40423-13), HPPG-ESU-TU077A-014 (160-40423-14), HPPG-ESU-TU077A-015 (160-40423-15), HPPG-ESU-TU077A-016 (160-40423-16), HPPG-ESU-TU077A-017 (160-40423-17), HPPG-ESU-TU077A-018 (160-40423-18), HPPG-ESU-TU077A-019 (160-40423-19), HPPG-ESU-TU077A-020 (160-40423-20), HPPG-ESU-TU077A-021 (160-40423-21), HPPG-ESU-TU077A-022 (160-40423-22), HPPG-ESU-TU077A-023 (160-40423-23), HPPG-ESU-TU077A-024 (160-40423-24), HPPG-ESU-TU077A-025 (160-40423-25), HPPG-F-033 (160-40423-26) and HPPG-F-034 (160-40423-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were leached on 11/18/2020, prepared on 11/20/2020 and analyzed on 12/13/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223

Case Narrative

Page 61 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Job ID: 160-40423-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma Prep batch 489912

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489912/1-A)

The method blank (MB) z-score associated with Prep Batch 160-489912 is within limits and is stored in the level IV raw data. (MB 160-489912/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

HPPG-ESU-TU077A-022 (160-40423-22)

Gamma Prep batch 489913

The MB z-score for Ti-208 associated with Prep Batch 160-489913 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489913/1-A)

The replicate precision for Pb-212/Th-228 associated with Prep Batch 160-489458 and 160-489913 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40426-A-16-C DU)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

HPPG-ESU-TU077A-024 (160-40423-24)

Gamma Prep batch 489914

The method blank (MB) z-score associated with Prep Batch 160-489914 is within limits and is stored in the level IV raw data. (MB 160-489914/1-A)

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489914/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

HPPG-ESU-TU077A-002 (160-40423-2), HPPG-ESU-TU077A-005 (160-40423-5) and HPPG-ESU-TU077A-009 (160-40423-9)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU: HPPG-ESU-TU077A-003 (160-40423-3). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

Gamma Prep batch 489915

The method blank (MB) z-score associated with Prep Batch 160-489915 is within limits and is stored in the level IV raw data. (MB 160-489915/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to

Job ID: 160-40423-1 (Continued)**Laboratory: Eurofins TestAmerica, St. Louis (Continued)**

low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489915/1-A)

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. The method blank activity is below the DLC and RL. (MB 160-489915/1-A)

The replicate precision for Th-234/U-238 associated with Prep Batch 160-489454 and 160-489915 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40423-A-15-C DU)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.
HPPG-ESU-TU077A-011 (160-40423-11)

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU for (160-40423-15;-Th-234 and LCS; Pa-234m: (LCS 160-489915/2-A) and (160-40423-A-15-C DU). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-031

Page 1 of 4

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389
Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
Sample Lead: Murri, Andrew

Sample Tech(s): Paul Leblanc

Project Number: 501197		Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action		Analysis Requested			
Project Location: San Francisco, CA							
Purchase Order #: 1159058		Shipment/Pickup Date: 11/16/2020					
Waybill Number: 4957 5225 6078							
Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046		Gamma Spec (EPA 905 M)- Full 21 day in growth gamma					
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8866		Preservatives (water)					
		Preservatives (soil)					
		Matrix		# of Containers			
		Sample ID		Date	Time	Method	Container Type
HPPG-ESU-TU077A-001		11/11/2020		13:03	G	SO	1 16 oz. plastic jar
HPPG-ESU-TU077A-002		11/11/2020		13:06	G	SO	1 16 oz. plastic jar
HPPG-ESU-TU077A-003		11/11/2020		13:09	G	SO	1 16 oz. plastic jar
HPPG-ESU-TU077A-004		11/11/2020		13:11	G	SO	1 16 oz. plastic jar
HPPG-ESU-TU077A-005		11/11/2020		13:12	G	SO	1 16 oz. plastic jar
HPPG-ESU-TU077A-006		11/11/2020		13:13	G	SO	1 16 oz. plastic jar
HPPG-ESU-TU077A-007		11/11/2020		13:14	G	SO	1 16 oz. plastic jar
HPPG-ESU-TU077A-008		11/11/2020		13:16	G	SO	1 16 oz. plastic jar

Special Instructions:

21 day ingrowth results only

Turaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I	II	III	Project Specific	Receive Date Time:
Method Codes: C = Composite G = Grab	DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening									

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:
Murri, Andrew		11/11/2020 17:07	Locked Storage (RKillpack)	
Locked Storage (RKillpack)		11/16/2020 14:22	Devin Lewis	
Devin Lewis		11/16/2020 14:26	SHIPPEDTO LAB	

*** Last 3 transfers shown above - Complete list of transfers on last page ***

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CHAIN OF CUSTODY

Ref. Document # 501197RSY-031

Page 2 of 4

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 501197
Project Name: G Remedial Action

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
Concord, CA 94520

Sample Lead: Murri, Andrew
Sample Tech(s): Paul Leblanc

Analysis Requested						
Strontium-90 (EPA 905 MOD)						
Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma						
Preservatives (water)						
Sample ID	Date	Time	Method	Matrix	# of Containers	Container Type
HPPG-ESU-TU077A-009	11/11/2020	13:18	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-010	11/11/2020	13:20	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-011	11/11/2020	13:21	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-012	11/11/2020	13:23	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-013	11/11/2020	13:24	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-014	11/11/2020	13:26	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-015	11/11/2020	13:28	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-016	11/11/2020	13:29	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-017	11/11/2020	13:32	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-018	11/11/2020	13:34	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-019	11/11/2020	13:36	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-020	11/11/2020	13:37	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-021	11/11/2020	13:39	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-022	11/11/2020	13:41	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-023	11/11/2020	13:43	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-024	11/11/2020	13:46	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077A-025	11/11/2020	13:49	G	SO	1	16 oz. plastic jar



CHAIN OF CUSTODY

Ref. Document # 501197RSY-031

Page 3 of 4

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 501197

Phone/Fax Number: 415-887-0760

Project Name: G Remedial Action

Address: 4005 Port Chicago Hwy

City: Concord, CA 94520

Send Report to: Rose Condit

Phone #: (619)213-3389

Phone/Fax Number: 415-887-0760

Project Location: San Francisco, CA

Address: 4005 Port Chicago Hwy

City: Concord, CA 94520

Sample Lead: Murri, Andrew

Purchase Order #: 1159058

Sample Tech(s): Paul Leblanc

Shipment/Pickup Date: 11/16/2020

Waybill Number: 4195702256078

Phone/Fax Number: 415-887-0760

Test America (St. Louis Lab)

Address: 4005 Port Chicago Hwy

Lab Destination: 13715 Rider Trail North

City: Concord, CA 94520

Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Comment

Collection Information

Preservatives (water)

Containers

Preservatives (soil)

Matrix

of Containers

Container Type

Method

Date

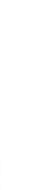
Time

Sample ID

Sample ID	Date	Time	Method	Matrix	# of Containers	Container Type	Preservatives (soil)	Preservatives (water)	Containers	Matrix	# of Containers	Container Type	Method	Date	Time	Collection Information	
HPPG-F-033	11/11/2020	13:03	G	SO	1	16 oz. plastic jar	X	X			5	GJ46599771					
HPPG-F-034	11/11/2020	13:32	G	SO	1	16 oz. plastic jar	X				5	GJ46599771					

All Transfers for COC 501197RSY-031

Page 4 of 4

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		11/11/2020 17:07	Locked Storage (RKilpack)		11/11/2020 17:07
Locked Storage (RKilpack)		11/16/2020 14:22	Devin Lewis		11/16/2020 14:22
Devin Lewis		11/16/2020 14:26	SHIPPED TO LAB		11/17/2020 09:05


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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40423-1

SDG Number: GJ46599771

Login Number: 40423**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Greer, Diane A

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Page 68 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Qualifiers

Rad

Qualifier

Qualifier Description

U Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 69 of 110

Job ID: 160-40423-1
SDG: GJ46599771

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Page 70 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40423-1	HPPG-ESU-TU077A-001	Solid	11/11/20 13:03	11/17/20 09:05	
160-40423-2	HPPG-ESU-TU077A-002	Solid	11/11/20 13:06	11/17/20 09:05	
160-40423-3	HPPG-ESU-TU077A-003	Solid	11/11/20 13:09	11/17/20 09:05	
160-40423-4	HPPG-ESU-TU077A-004	Solid	11/11/20 13:11	11/17/20 09:05	
160-40423-5	HPPG-ESU-TU077A-005	Solid	11/11/20 13:12	11/17/20 09:05	
160-40423-6	HPPG-ESU-TU077A-006	Solid	11/11/20 13:13	11/17/20 09:05	
160-40423-7	HPPG-ESU-TU077A-007	Solid	11/11/20 13:14	11/17/20 09:05	
160-40423-8	HPPG-ESU-TU077A-008	Solid	11/11/20 13:16	11/17/20 09:05	
160-40423-9	HPPG-ESU-TU077A-009	Solid	11/11/20 13:18	11/17/20 09:05	
160-40423-10	HPPG-ESU-TU077A-010	Solid	11/11/20 13:20	11/17/20 09:05	
160-40423-11	HPPG-ESU-TU077A-011	Solid	11/11/20 13:21	11/17/20 09:05	
160-40423-12	HPPG-ESU-TU077A-012	Solid	11/11/20 13:23	11/17/20 09:05	
160-40423-13	HPPG-ESU-TU077A-013	Solid	11/11/20 13:24	11/17/20 09:05	
160-40423-14	HPPG-ESU-TU077A-014	Solid	11/11/20 13:26	11/17/20 09:05	
160-40423-15	HPPG-ESU-TU077A-015	Solid	11/11/20 13:28	11/17/20 09:05	
160-40423-16	HPPG-ESU-TU077A-016	Solid	11/11/20 13:29	11/17/20 09:05	
160-40423-17	HPPG-ESU-TU077A-017	Solid	11/11/20 13:32	11/17/20 09:05	
160-40423-18	HPPG-ESU-TU077A-018	Solid	11/11/20 13:34	11/17/20 09:05	
160-40423-19	HPPG-ESU-TU077A-019	Solid	11/11/20 13:36	11/17/20 09:05	
160-40423-20	HPPG-ESU-TU077A-020	Solid	11/11/20 13:37	11/17/20 09:05	
160-40423-21	HPPG-ESU-TU077A-021	Solid	11/11/20 13:39	11/17/20 09:05	
160-40423-22	HPPG-ESU-TU077A-022	Solid	11/11/20 13:41	11/17/20 09:05	
160-40423-23	HPPG-ESU-TU077A-023	Solid	11/11/20 13:43	11/17/20 09:05	
160-40423-24	HPPG-ESU-TU077A-024	Solid	11/11/20 13:46	11/17/20 09:05	
160-40423-25	HPPG-ESU-TU077A-025	Solid	11/11/20 13:49	11/17/20 09:05	
160-40423-26	HPPG-F-033	Solid	11/11/20 13:03	11/17/20 09:05	
160-40423-27	HPPG-F-034	Solid	11/11/20 13:32	11/17/20 09:05	

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 71 of 110

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40423-1
 SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-001
Lab Sample ID: 160-40423-1

Matrix: Solid

Date Collected: 11/11/20 13:03

Date Received: 11/17/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.129	U	0.129	0.129	0.331	0.117	pCi/g	12/29/20 21:17	01/07/21 16:10	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	101		40 - 110					12/29/20 21:17	01/07/21 16:10	1
Y Carrier	86.7		40 - 110					12/29/20 21:17	01/07/21 16:10	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.450		0.115	0.124		0.0179	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Actinium-227	-0.251	U	0.505	0.506		0.293	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Bismuth-212	0.843		0.289	0.302		0.0577	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Bismuth-214	0.358		0.0939	0.101		0.0373	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Cesium-137	-0.0129	U	0.0461	0.0461	0.0700	0.0370	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Lead-210	0.518	U	0.942	0.944		0.749	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Lead-212	0.406		0.0687	0.0864		0.0325	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Lead-214	0.464		0.0797	0.0931		0.0412	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Potassium-40	9.23		1.06	1.42		0.0705	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Protactinium-231	0.482	U	1.36	1.36		1.48	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Protactinium-234	0.120	U	0.141	0.142		0.153	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Radium-226	0.358		0.0939	0.101	0.200	0.0373	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Radium-228	0.450		0.115	0.124		0.0179	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thallium-208	0.161		0.0465	0.0494		0.0167	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thorium 228	0.406		0.0687	0.0864		0.0325	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thorium-232	0.450		0.115	0.124		0.0179	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Thorium-234	0.340		0.266	0.269		0.232	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Uranium-235	-0.0117	U	0.0193	0.0193		0.328	pCi/g	11/20/20 21:15	12/13/20 19:17	1
Uranium-238	0.340		0.266	0.269		0.232	pCi/g	11/20/20 21:15	12/13/20 19:17	1

Client Sample ID: HPPG-ESU-TU077A-002
Lab Sample ID: 160-40423-2

Matrix: Solid

Date Collected: 11/11/20 13:06

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.865		0.203	0.221		0.0408	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Actinium-227	-0.508	U	0.924	0.926		0.533	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Bismuth-212	-0.0546	U	1.15	1.15		0.943	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Bismuth-214	0.539		0.144	0.155		0.0514	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Cesium-137	0.0365	U	0.0902	0.0903	0.0700	0.0713	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-210	-0.0392	U	1.75	1.75		1.44	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-212	0.621		0.177	0.195		0.0788	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-214	0.424		0.168	0.173		0.109	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Potassium-40	10.3		1.75	2.04		0.303	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Protactinium-231	0.600	U	1.86	1.86		2.04	pCi/g	11/20/20 21:15	12/13/20 19:19	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 72 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-002

Lab Sample ID: 160-40423-2

Matrix: Solid

Date Collected: 11/11/20 13:06

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0206	U	0.0329	0.0329		0.302	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Radium-226	0.539		0.144	0.155	0.200	0.0514	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Radium-228	0.865		0.203	0.221		0.0408	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thallium-208	0.289		0.0733	0.0792		0.0189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium 228	0.621		0.177	0.195		0.0788	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium-232	0.865		0.203	0.221		0.0408	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium-234	-0.887	U	0.806	0.812		1.43	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-235	-0.263	U	0.428	0.429		0.523	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-238	-0.887	U	0.806	0.812		1.43	pCi/g	11/20/20 21:15	12/13/20 19:19	1

Client Sample ID: HPPG-ESU-TU077A-003

Lab Sample ID: 160-40423-3

Matrix: Solid

Date Collected: 11/11/20 13:09

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.543		0.202	0.209		0.112	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Actinium-227	-0.0635	U	0.592	0.592		0.366	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Bismuth-212	0.325	U	0.676	0.677		0.523	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Bismuth-214	0.397		0.139	0.145		0.0644	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Cesium-137	0.0200	U	0.0644	0.0645	0.0700	0.0513	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Lead-210	1.44		1.29	1.30		0.849	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Lead-212	0.374		0.0858	0.0985		0.0404	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Lead-214	0.486		0.122	0.132		0.0620	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Potassium-40	7.18		1.25	1.45		0.277	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Protactinium-231	-0.915	U	3.13	3.13		2.55	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Protactinium-234	0.145	U	0.195	0.195		0.228	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Radium-226	0.397		0.139	0.145	0.200	0.0644	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Radium-228	0.543		0.202	0.209		0.112	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Thallium-208	0.0913		0.0797	0.0802		0.0376	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Thorium 228	0.374		0.0858	0.0985		0.0404	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Thorium-232	0.543		0.202	0.209		0.112	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Thorium-234	-1.04	U	0.661	0.672		0.859	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Uranium-235	0.208	U	0.307	0.308		0.253	pCi/g	11/20/20 21:15	12/13/20 19:20	1
Uranium-238	-1.04	U	0.661	0.672		0.859	pCi/g	11/20/20 21:15	12/13/20 19:20	1

Client Sample ID: HPPG-ESU-TU077A-004

Lab Sample ID: 160-40423-4

Matrix: Solid

Date Collected: 11/11/20 13:11

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.352		0.154	0.159		0.189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Actinium-227	-0.0137	U	0.829	0.829		0.441	pCi/g	11/20/20 21:15	12/13/20 19:19	1

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Client Sample Results

Page 73 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-004

Lab Sample ID: 160-40423-4

Matrix: Solid

Date Collected: 11/11/20 13:11

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-212	1.54		0.602	0.628		0.138	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Bismuth-214	0.637		0.196	0.210		0.0756	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Cesium-137	-0.0252 U		0.0960	0.0961	0.0700	0.0770	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-210	0.665 U		1.84	1.84		1.27	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-212	0.442		0.127	0.137		0.0747	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Lead-214	0.556		0.161	0.173		0.0859	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Potassium-40	10.7		1.80	2.18		0.374	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Protactinium-231	0.393 U		1.88	1.88		2.92	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Protactinium-234	0.0157 U		0.0294	0.0294		0.338	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Radium-226	0.637		0.196	0.210	0.200	0.0756	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Radium-228	0.352		0.154	0.159		0.189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thallium-208	0.304		0.0968	0.103		0.0362	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium 228	0.442		0.127	0.137		0.0747	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium-232	0.352		0.154	0.159		0.189	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Thorium-234	-0.184 U		1.24	1.24		1.02	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-235	-0.122 U		0.275	0.275		0.723	pCi/g	11/20/20 21:15	12/13/20 19:19	1
Uranium-238	-0.184 U		1.24	1.24		1.02	pCi/g	11/20/20 21:15	12/13/20 19:19	1

Client Sample ID: HPPG-ESU-TU077A-005

Lab Sample ID: 160-40423-5

Matrix: Solid

Date Collected: 11/11/20 13:12

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.405		0.340	0.342		0.161	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Actinium-227	0.0314 U		0.0482	0.0483		0.409	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Bismuth-212	0.410 U		0.729	0.731		0.544	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Bismuth-214	0.510		0.155	0.163		0.0570	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Cesium-137	-0.0242 U		0.116	0.116	0.0700	0.0943	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Lead-210	-2.09 U		2.08	2.09		2.05	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Lead-212	0.500		0.0987	0.112		0.0390	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Lead-214	0.561		0.132	0.144		0.0481	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Potassium-40	6.49		1.44	1.58		0.261	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Protactinium-231	0.000 U		0.898	0.898		2.63	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Protactinium-234	0.0367 U		0.0561	0.0563		0.262	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Radium-226	0.510		0.155	0.163	0.200	0.0570	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Radium-228	0.405		0.340	0.342		0.161	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thallium-208	0.251		0.0773	0.0814		0.0196	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thorium 228	0.500		0.0987	0.112		0.0390	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thorium-232	0.405		0.340	0.342		0.161	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Thorium-234	0.870		0.718	0.724		0.488	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Uranium-235	0.125 U		0.314	0.315		0.299	pCi/g	11/20/20 21:15	12/13/20 19:22	1
Uranium-238	0.870		0.718	0.724		0.488	pCi/g	11/20/20 21:15	12/13/20 19:22	1

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Client Sample Results

Page 74 of 110

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40423-1
 SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-006
Lab Sample ID: 160-40423-6
Matrix: Solid

Date Collected: 11/11/20 13:13

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.273		0.131	0.134		0.128	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Actinium-227	-0.316	U	0.569	0.570		0.421	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Bismuth-212	-0.318	U	0.688	0.689		0.697	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Bismuth-214	0.373		0.127	0.132		0.0431	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Cesium-137	-0.00184	U	0.0642	0.0642	0.0700	0.0527	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Lead-210	0.392	U	1.55	1.55		1.25	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Lead-212	0.330		0.0872	0.0970		0.0442	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Lead-214	0.421		0.108	0.116		0.0517	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Potassium-40	7.12		1.31	1.50		0.347	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Protactinium-231	-0.873	U	2.97	2.97		2.42	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Protactinium-234	0.0526	U	0.114	0.114		0.171	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Radium-226	0.373		0.127	0.132	0.200	0.0431	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Radium-228	0.273		0.131	0.134		0.128	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Thallium-208	0.153		0.0504	0.0529		0.0170	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Thorium 228	0.330		0.0872	0.0970		0.0442	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Thorium-232	0.273		0.131	0.134		0.128	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Thorium-234	-0.795	U	0.940	0.944		0.828	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Uranium-235	0.254	U	0.249	0.251		0.264	pCi/g	11/20/20 21:15	12/13/20 19:24	1
Uranium-238	-0.795	U	0.940	0.944		0.828	pCi/g	11/20/20 21:15	12/13/20 19:24	1

Client Sample ID: HPPG-ESU-TU077A-007
Lab Sample ID: 160-40423-7
Matrix: Solid

Date Collected: 11/11/20 13:14

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.155		0.194	0.195		0.113	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Actinium-227	-0.310	U	0.302	0.305		0.366	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Bismuth-212	-0.0327	U	0.575	0.575		0.456	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Bismuth-214	0.338		0.0962	0.102		0.0390	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Cesium-137	0.000	U	0.0164	0.0164	0.0700	0.0492	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Lead-210	0.601	U	1.33	1.34		1.07	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Lead-212	0.468		0.0778	0.0986		0.0242	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Lead-214	0.260		0.0894	0.0934		0.0492	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Potassium-40	7.79		1.21	1.45		0.284	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-231	0.554	U	1.52	1.53		1.67	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-234	0.0899	U	0.0901	0.0906		0.220	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Radium-226	0.338		0.0962	0.102	0.200	0.0390	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Radium-228	0.155		0.194	0.195		0.113	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thallium-208	0.166		0.0448	0.0480		0.0121	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thorium 228	0.468		0.0778	0.0986		0.0242	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thorium-232	0.155		0.194	0.195		0.113	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thorium-234	0.0000000	U	0.984	0.984		0.811	pCi/g	11/20/20 21:15	12/13/20 20:26	1
	296									
Uranium-235	0.000	U	0.0826	0.0826		0.413	pCi/g	11/20/20 21:15	12/13/20 20:26	1

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Client Sample Results

Page 75 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-007

Date Collected: 11/11/20 13:14
Date Received: 11/17/20 09:05

Lab Sample ID: 160-40423-7

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Uranium-238	0.000000	U	0.984	0.984		0.811	pCi/g	11/20/20 21:15	12/13/20 20:26	1
	296									

Client Sample ID: HPPG-ESU-TU077A-008

Date Collected: 11/11/20 13:16
Date Received: 11/17/20 09:05

Lab Sample ID: 160-40423-8

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.639		0.213	0.223		0.172	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Actinium-227	0.167	U	0.527	0.528		0.319	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Bismuth-212	0.367	U	0.612	0.613		0.454	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Bismuth-214	0.505		0.163	0.171		0.0692	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Cesium-137	-0.00532	U	0.0668	0.0668	0.0700	0.0545	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Lead-210	1.68		1.54	1.56		1.00	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Lead-212	0.529		0.106	0.120		0.0480	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Lead-214	0.490		0.148	0.156		0.0746	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Potassium-40	9.97		1.51	1.82		0.134	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-231	0.000	U	0.807	0.807		2.46	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Protactinium-234	0.0984	U	0.338	0.338		0.275	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Radium-226	0.505		0.163	0.171	0.200	0.0692	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Radium-228	0.639		0.213	0.223		0.172	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thallium-208	0.181		0.0564	0.0593		0.0140	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thorium 228	0.529		0.106	0.120		0.0480	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thorium-232	0.639		0.213	0.223		0.172	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Thorium-234	0.907		0.638	0.646		0.468	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Uranium-235	0.0180	U	0.226	0.226		0.473	pCi/g	11/20/20 21:15	12/13/20 20:26	1
Uranium-238	0.907		0.638	0.646		0.468	pCi/g	11/20/20 21:15	12/13/20 20:26	1

Client Sample ID: HPPG-ESU-TU077A-009

Date Collected: 11/11/20 13:18
Date Received: 11/17/20 09:05

Lab Sample ID: 160-40423-9

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.787		0.252	0.265		0.0470	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Actinium-227	-0.402	U	0.860	0.861		0.518	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Bismuth-212	0.443	U	0.894	0.896		0.681	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Bismuth-214	0.329		0.166	0.170		0.0916	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Cesium-137	-0.0116	U	0.0896	0.0896	0.0700	0.0747	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Lead-210	1.04		1.34	1.35		0.886	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Lead-212	0.511		0.110	0.129		0.0457	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Lead-214	0.416		0.138	0.145		0.0941	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Potassium-40	9.73		1.83	2.08		0.321	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Protactinium-231	0.704	U	2.14	2.15		2.36	pCi/g	11/20/20 21:15	12/13/20 19:23	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 76 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-009

Lab Sample ID: 160-40423-9

Matrix: Solid

Date Collected: 11/11/20 13:18

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Protactinium-234	-0.0977	U	0.253	0.253		0.203	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Radium-226	0.329		0.166	0.170	0.200	0.0916	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Radium-228	0.787		0.252	0.265		0.0470	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Thallium-208	0.157		0.0683	0.0702		0.0262	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Thorium 228	0.511		0.110	0.129		0.0457	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Thorium-232	0.787		0.252	0.265		0.0470	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Thorium-234	0.507		0.567	0.570		0.457	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Uranium-235	0.212	U	0.394	0.394		0.277	pCi/g	11/20/20 21:15	12/13/20 19:23	1
Uranium-238	0.507		0.567	0.570		0.457	pCi/g	11/20/20 21:15	12/13/20 19:23	1

Client Sample ID: HPPG-ESU-TU077A-010

Lab Sample ID: 160-40423-10

Matrix: Solid

Date Collected: 11/11/20 13:20

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.439		0.228	0.233		0.0967	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Actinium-227	-0.123	U	0.622	0.622		0.366	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Bismuth-212	0.304	U	0.547	0.548		0.417	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Bismuth-214	0.381		0.107	0.114		0.0449	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Cesium-137	0.0164	U	0.0599	0.0599	0.0700	0.0480	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Lead-210	0.588	U	1.21	1.21		0.963	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Lead-212	0.523		0.0869	0.110		0.0354	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Lead-214	0.489		0.102	0.114		0.0466	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Potassium-40	8.67		1.21	1.50		0.0985	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Protactinium-231	0.101	U	1.19	1.19		1.97	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Protactinium-234	0.141	U	0.235	0.235		0.200	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Radium-226	0.381		0.107	0.114	0.200	0.0449	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Radium-228	0.439		0.228	0.233		0.0967	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Thallium-208	0.161		0.0546	0.0571		0.0198	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Thorium 228	0.523		0.0869	0.110		0.0354	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Thorium-232	0.439		0.228	0.233		0.0967	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Thorium-234	0.876		0.490	0.500		0.275	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Uranium-235	-0.103	U	0.277	0.277		0.456	pCi/g	11/20/20 22:00	12/13/20 10:56	1
Uranium-238	0.876		0.490	0.500		0.275	pCi/g	11/20/20 22:00	12/13/20 10:56	1

Client Sample ID: HPPG-ESU-TU077A-011

Lab Sample ID: 160-40423-11

Matrix: Solid

Date Collected: 11/11/20 13:21

Date Received: 11/17/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.154		0.150	0.150	0.331	0.110	pCi/g	12/29/20 21:17	01/07/21 16:10	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 77 of 110

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40423-1
 SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-011
Lab Sample ID: 160-40423-11

Date Collected: 11/11/20 13:21

Matrix: Solid

Date Received: 11/17/20 09:05

Carrier	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	95.2		40 - 110	12/29/20 21:17	01/07/21 16:10	1
Y Carrier	88.2		40 - 110	12/29/20 21:17	01/07/21 16:10	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.630		0.174	0.185		0.0703	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Actinium-227	-0.401	U	0.787	0.789		0.475	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Bismuth-212	0.0894	U	0.993	0.993		0.810	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Bismuth-214	0.456		0.140	0.148		0.0523	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Cesium-137	-0.0198	U	0.0972	0.0972	0.0700	0.0785	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-210	0.612	U	1.31	1.31		1.02	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-212	0.633		0.110	0.128		0.0445	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-214	0.499		0.117	0.127		0.0498	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Potassium-40	10.7		1.97	2.25		0.471	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Protactinium-231	0.000	U	0.713	0.713		2.34	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Protactinium-234	0.0445	U	0.0813	0.0814		0.296	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Radium-226	0.456		0.140	0.148	0.200	0.0523	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Radium-228	0.630		0.174	0.185		0.0703	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thallium-208	0.288		0.0971	0.101		0.0345	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thorium 228	0.633		0.110	0.128		0.0445	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thorium-232	0.630		0.174	0.185		0.0703	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thorium-234	0.863		0.603	0.611		0.513	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Uranium-235	-0.208	U	0.189	0.190		0.554	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Uranium-238	0.863		0.603	0.611		0.513	pCi/g	11/20/20 22:00	12/13/20 11:37	1

Client Sample ID: HPPG-ESU-TU077A-012
Lab Sample ID: 160-40423-12

Date Collected: 11/11/20 13:23

Matrix: Solid

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.305		0.235	0.237		0.113	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Actinium-227	-0.344	U	0.635	0.637		0.415	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Bismuth-212	-0.0185	U	0.543	0.543		0.655	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Bismuth-214	0.481		0.124	0.134		0.0359	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Cesium-137	-0.0442	U	0.0793	0.0794	0.0700	0.0622	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Lead-210	1.08		1.51	1.52		0.971	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Lead-212	0.495		0.0975	0.117		0.0471	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Lead-214	0.500		0.101	0.114		0.0575	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Potassium-40	8.95		1.36	1.64		0.308	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Protactinium-231	0.489	U	2.03	2.04		2.19	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Protactinium-234	-0.00853	U	0.0187	0.0188		0.189	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Radium-226	0.481		0.124	0.134	0.200	0.0359	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Radium-228	0.305		0.235	0.237		0.113	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Thallium-208	0.146		0.0518	0.0540		0.0214	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Thorium 228	0.495		0.0975	0.117		0.0471	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Thorium-232	0.305		0.235	0.237		0.113	pCi/g	11/20/20 22:00	12/13/20 11:01	1

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Client Sample Results

Page 78 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-012

Lab Sample ID: 160-40423-12

Matrix: Solid

Date Collected: 11/11/20 13:23

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Thorium-234	-0.0320	U	0.994	0.994		0.819	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Uranium-235	0.000	U	0.167	0.167		0.309	pCi/g	11/20/20 22:00	12/13/20 11:01	1
Uranium-238	-0.0320	U	0.994	0.994		0.819	pCi/g	11/20/20 22:00	12/13/20 11:01	1

Client Sample ID: HPPG-ESU-TU077A-013

Lab Sample ID: 160-40423-13

Matrix: Solid

Date Collected: 11/11/20 13:24

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.475		0.209	0.214		0.106	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Actinium-227	0.287	U	0.446	0.447		0.358	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Bismuth-212	0.568	U	1.10	1.10		0.849	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Bismuth-214	0.423		0.180	0.185		0.0956	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Cesium-137	0.00301	U	0.0730	0.0730	0.0700	0.0595	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-210	-0.107	U	1.76	1.76		1.25	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-212	0.441		0.115	0.128		0.0584	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Lead-214	0.339		0.144	0.148		0.0780	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Potassium-40	8.62		1.76	1.97		0.335	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Protactinium-231	-0.0000000	U	2.53	2.53		2.09	pCi/g	11/20/20 22:00	12/13/20 11:37	1
	807									
Protactinium-234	0.162	U	0.259	0.260		0.185	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Radium-226	0.423		0.180	0.185	0.200	0.0956	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Radium-228	0.475		0.209	0.214		0.106	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thallium-208	0.186		0.0653	0.0681		0.0186	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thorium 228	0.441		0.115	0.128		0.0584	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thorium-232	0.475		0.209	0.214		0.106	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Thorium-234	-0.249	U	1.13	1.13		0.937	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Uranium-235	-0.0269	U	0.0501	0.0502		0.409	pCi/g	11/20/20 22:00	12/13/20 11:37	1
Uranium-238	-0.249	U	1.13	1.13		0.937	pCi/g	11/20/20 22:00	12/13/20 11:37	1

Client Sample ID: HPPG-ESU-TU077A-014

Lab Sample ID: 160-40423-14

Matrix: Solid

Date Collected: 11/11/20 13:26

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.475		0.251	0.256		0.110	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Actinium-227	0.193	U	0.294	0.295		0.258	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Bismuth-212	-0.475	U	0.678	0.680		0.665	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Bismuth-214	0.458		0.127	0.136		0.0458	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Cesium-137	0.0297	U	0.0597	0.0597	0.0700	0.0468	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Lead-210	-0.238	U	1.44	1.44		1.17	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Lead-212	0.412		0.0827	0.0984		0.0404	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Lead-214	0.345		0.0940	0.101		0.0487	pCi/g	11/20/20 22:00	12/13/20 11:34	1

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Client Sample Results

Page 79 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-014

Lab Sample ID: 160-40423-14

Matrix: Solid

Date Collected: 11/11/20 13:26

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Potassium-40	8.18		1.31	1.56		0.364	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Protactinium-231	-0.866	U	2.66	2.66		2.17	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Protactinium-234	0.0756	U	0.219	0.219		0.178	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Radium-226	0.458		0.127	0.136	0.200	0.0458	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Radium-228	0.475		0.251	0.256		0.110	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thallium-208	0.194		0.0474	0.0515		0.0117	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thorium 228	0.412		0.0827	0.0984		0.0404	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thorium-232	0.475		0.251	0.256		0.110	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Thorium-234	0.000	U	0.418	0.418		0.823	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Uranium-235	0.0582	U	0.176	0.176		0.344	pCi/g	11/20/20 22:00	12/13/20 11:34	1
Uranium-238	0.000	U	0.418	0.418		0.823	pCi/g	11/20/20 22:00	12/13/20 11:34	1

Client Sample ID: HPPG-ESU-TU077A-015

Lab Sample ID: 160-40423-15

Matrix: Solid

Date Collected: 11/11/20 13:28

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.543		0.148	0.158		0.0228	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Actinium-227	-0.257	U	0.534	0.535		0.308	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Bismuth-212	0.310	U	0.573	0.574		0.443	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Bismuth-214	0.309		0.101	0.106		0.0595	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Cesium-137	-0.0139	U	0.0455	0.0455	0.0700	0.0362	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Lead-210	1.01		1.16	1.17		0.903	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Lead-212	0.552		0.0855	0.111		0.0351	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Lead-214	0.515		0.0900	0.105		0.0472	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Potassium-40	8.99		1.22	1.53		0.168	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Protactinium-231	-0.156	U	0.527	0.527		2.00	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Protactinium-234	0.0850	U	0.246	0.246		0.200	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Radium-226	0.309		0.101	0.106	0.200	0.0595	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Radium-228	0.543		0.148	0.158		0.0228	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thallium-208	0.193		0.0513	0.0551		0.0151	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thorium 228	0.552		0.0855	0.111		0.0351	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thorium-232	0.543		0.148	0.158		0.0228	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Thorium-234	0.930		0.395	0.408		0.265	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Uranium-235	0.000	U	0.168	0.168		0.348	pCi/g	11/20/20 22:00	12/13/20 11:35	1
Uranium-238	0.930		0.395	0.408		0.265	pCi/g	11/20/20 22:00	12/13/20 11:35	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 80 of 110

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40423-1
 SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-016
Lab Sample ID: 160-40423-16

Date Collected: 11/11/20 13:29

Matrix: Solid

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.621		0.181	0.191		0.0498	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Actinium-227	-0.298	U	0.579	0.580		0.335	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Bismuth-212	0.180	U	0.600	0.600		0.478	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Bismuth-214	0.280		0.0982	0.102		0.0583	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Cesium-137	0.0125	U	0.0342	0.0343	0.0700	0.0266	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Lead-210	-0.292	U	1.09	1.09		0.879	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Lead-212	0.469		0.0789	0.0996		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Lead-214	0.396		0.0849	0.0943		0.0382	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Potassium-40	7.70		1.08	1.34		0.0879	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Protactinium-231	-0.217	U	2.18	2.18		1.79	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Protactinium-234	0.0591	U	0.220	0.220		0.189	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Radium-226	0.280		0.0982	0.102	0.200	0.0583	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Radium-228	0.621		0.181	0.191		0.0498	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Thallium-208	0.134		0.0651	0.0665		0.0263	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Thorium 228	0.469		0.0789	0.0996		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Thorium-232	0.621		0.181	0.191		0.0498	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Thorium-234	0.228	U	0.713	0.713		0.580	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Uranium-235	0.0639	U	0.160	0.160		0.334	pCi/g	11/20/20 19:07	12/13/20 12:52	1
Uranium-238	0.228	U	0.713	0.713		0.580	pCi/g	11/20/20 19:07	12/13/20 12:52	1

Client Sample ID: HPPG-ESU-TU077A-017
Lab Sample ID: 160-40423-17

Date Collected: 11/11/20 13:32

Matrix: Solid

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.433		0.234	0.239		0.0918	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Actinium-227	0.0386	U	0.111	0.111		0.351	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Bismuth-212	-0.102	U	0.899	0.899		0.731	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Bismuth-214	0.517		0.139	0.149		0.0480	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Cesium-137	-0.0159	U	0.0549	0.0550	0.0700	0.0432	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-210	0.0167	U	1.56	1.56		1.28	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-212	0.340		0.0971	0.107		0.0544	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-214	0.353		0.114	0.120		0.0628	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Potassium-40	6.37		1.34	1.49		0.283	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-231	-1.13	U	3.36	3.36		2.73	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-234	0.0970	U	0.302	0.302		0.238	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Radium-226	0.517		0.139	0.149	0.200	0.0480	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Radium-228	0.433		0.234	0.239		0.0918	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thallium-208	0.166		0.0564	0.0590		0.0176	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium 228	0.340		0.0971	0.107		0.0544	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium-232	0.433		0.234	0.239		0.0918	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium-234	0.378	U	0.619	0.620		0.402	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-235	-0.00858	U	0.330	0.330		0.416	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-238	0.378	U	0.619	0.620		0.402	pCi/g	11/20/20 19:07	12/13/20 12:48	1

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Client Sample Results

Page 81 of 110

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40423-1
 SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-018
Lab Sample ID: 160-40423-18

Date Collected: 11/11/20 13:34

Matrix: Solid

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.590		0.206	0.214		0.0581	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Actinium-227	0.249	U	0.502	0.503		0.318	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Bismuth-212	1.52		0.506	0.530		0.0983	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Bismuth-214	0.600		0.146	0.159		0.0530	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Cesium-137	0.000	U	0.0369	0.0369	0.0700	0.0545	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-210	-0.608	U	1.82	1.82		1.52	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-212	0.375		0.102	0.113		0.0601	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Lead-214	0.529		0.109	0.122		0.0549	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Potassium-40	8.26		1.34	1.59		0.282	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-231	0.541	U	1.80	1.80		1.97	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Protactinium-234	-0.108	U	0.220	0.220		0.278	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Radium-226	0.600		0.146	0.159	0.200	0.0530	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Radium-228	0.590		0.206	0.214		0.0581	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thallium-208	0.222		0.0571	0.0616		0.0160	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium 228	0.375		0.102	0.113		0.0601	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium-232	0.590		0.206	0.214		0.0581	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Thorium-234	-1.14	U	0.828	0.838		0.929	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-235	-0.0206	U	0.0319	0.0320		0.317	pCi/g	11/20/20 19:07	12/13/20 12:48	1
Uranium-238	-1.14	U	0.828	0.838		0.929	pCi/g	11/20/20 19:07	12/13/20 12:48	1

Client Sample ID: HPPG-ESU-TU077A-019
Lab Sample ID: 160-40423-19

Date Collected: 11/11/20 13:36

Matrix: Solid

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.416		0.343	0.346		0.160	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Actinium-227	0.127	U	0.533	0.533		0.358	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Bismuth-212	-0.0284	U	0.938	0.938		0.770	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Bismuth-214	0.374		0.158	0.164		0.0774	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Cesium-137	0.0269	U	0.0680	0.0680	0.0700	0.0532	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Lead-210	0.688	U	1.51	1.51		1.06	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Lead-212	0.592		0.104	0.125		0.0377	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Lead-214	0.557		0.173	0.184		0.0770	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Potassium-40	11.9		1.74	2.21		0.317	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Protactinium-231	0.250	U	1.61	1.61		2.49	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Protactinium-234	-0.130	U	0.394	0.394		0.321	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Radium-226	0.374		0.158	0.164	0.200	0.0774	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Radium-228	0.416		0.343	0.346		0.160	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thallium-208	0.188		0.103	0.105		0.0518	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thorium 228	0.592		0.104	0.125		0.0377	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thorium-232	0.416		0.343	0.346		0.160	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Thorium-234	1.16		0.651	0.667		0.432	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Uranium-235	-0.247	U	0.811	0.812		0.556	pCi/g	11/20/20 19:07	12/13/20 12:53	1
Uranium-238	1.16		0.651	0.667		0.432	pCi/g	11/20/20 19:07	12/13/20 12:53	1

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Client Sample Results

Page 82 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-020

Lab Sample ID: 160-40423-20

Matrix: Solid

Date Collected: 11/11/20 13:37

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.527		0.321	0.325		0.144	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Actinium-227	-0.109	U	0.615	0.615		0.378	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Bismuth-212	0.259	U	0.620	0.621		0.473	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Bismuth-214	0.526		0.152	0.161		0.0605	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Cesium-137	0.0290	U	0.0611	0.0612	0.0700	0.0469	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-210	1.19		1.36	1.37		0.939	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-212	0.561		0.102	0.118		0.0449	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-214	0.516		0.125	0.136		0.0589	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Potassium-40	9.41		1.62	1.88		0.233	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-231	0.0908	U	1.22	1.22		2.49	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-234	0.00543	U	0.314	0.314		0.259	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Radium-226	0.526		0.152	0.161	0.200	0.0605	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Radium-228	0.527		0.321	0.325		0.144	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thallium-208	0.214		0.0701	0.0734		0.0220	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium 228	0.561		0.102	0.118		0.0449	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium-232	0.527		0.321	0.325		0.144	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium-234	-0.647	U	0.635	0.639		0.884	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-235	0.0219	U	0.113	0.113		0.409	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-238	-0.647	U	0.635	0.639		0.884	pCi/g	11/20/20 19:07	12/13/20 13:35	1

Client Sample ID: HPPG-ESU-TU077A-021

Lab Sample ID: 160-40423-21

Matrix: Solid

Date Collected: 11/11/20 13:39

Date Received: 11/17/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0369	U	0.138	0.138	0.331	0.116	pCi/g	12/16/20 14:29	01/04/21 13:55	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					12/16/20 14:29	01/04/21 13:55	1
Y Carrier	92.7		40 - 110					12/16/20 14:29	01/04/21 13:55	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.760		0.212	0.226		0.0763	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Actinium-227	0.216	U	0.539	0.539		0.364	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Bismuth-212	-0.00573	U	0.976	0.976		0.664	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Bismuth-214	0.169		0.107	0.108		0.143	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Cesium-137	-0.0169	U	0.0621	0.0621	0.0700	0.0495	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Lead-210	-1.19	U	1.82	1.83		1.54	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Lead-212	0.458		0.0974	0.114		0.0472	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Lead-214	0.621		0.131	0.146		0.0874	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Potassium-40	11.3		1.58	1.95		0.331	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Protactinium-231	0.000	U	0.690	0.690		2.50	pCi/g	11/20/20 19:07	12/13/20 13:38	1

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Client Sample Results

Page 83 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-021

Lab Sample ID: 160-40423-21

Matrix: Solid

Date Collected: 11/11/20 13:39

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Protactinium-234	0.00465	U	0.00758	0.00760		0.218	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Radium-226	0.169		0.107	0.108	0.200	0.143	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Radium-228	0.760		0.212	0.226		0.0763	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Thallium-208	0.193		0.0653	0.0683		0.0245	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Thorium 228	0.458		0.0974	0.114		0.0472	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Thorium-232	0.760		0.212	0.226		0.0763	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Thorium-234	0.477		0.599	0.601		0.467	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Uranium-235	0.0565	U	0.254	0.254		0.313	pCi/g	11/20/20 19:07	12/13/20 13:38	1
Uranium-238	0.477		0.599	0.601		0.467	pCi/g	11/20/20 19:07	12/13/20 13:38	1

Client Sample ID: HPPG-ESU-TU077A-022

Lab Sample ID: 160-40423-22

Matrix: Solid

Date Collected: 11/11/20 13:41

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.787		0.240	0.253		0.0426	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Actinium-227	0.0633	U	0.276	0.276		0.439	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Bismuth-212	-0.502	U	0.569	0.572		0.893	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Bismuth-214	0.329		0.146	0.150		0.0826	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Cesium-137	-0.0478	U	0.0952	0.0954	0.0700	0.0745	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-210	0.933		1.09	1.09		0.724	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-212	0.395		0.0977	0.110		0.0464	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Lead-214	0.408		0.126	0.133		0.0737	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Potassium-40	8.37		1.61	1.83		0.291	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-231	-0.440	U	2.75	2.75		2.24	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Protactinium-234	0.0606	U	0.0970	0.0972		0.217	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Radium-226	0.329		0.146	0.150	0.200	0.0826	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Radium-228	0.787		0.240	0.253		0.0426	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thallium-208	0.180		0.0606	0.0635		0.0162	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium 228	0.395		0.0977	0.110		0.0464	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium-232	0.787		0.240	0.253		0.0426	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Thorium-234	-0.781	U	0.629	0.635		0.889	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-235	0.115	U	0.335	0.335		0.270	pCi/g	11/20/20 19:07	12/13/20 13:35	1
Uranium-238	-0.781	U	0.629	0.635		0.889	pCi/g	11/20/20 19:07	12/13/20 13:35	1

Client Sample ID: HPPG-ESU-TU077A-023

Lab Sample ID: 160-40423-23

Matrix: Solid

Date Collected: 11/11/20 13:43

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.361		0.147	0.152		0.107	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Actinium-227	-0.190	U	0.873	0.873		0.335	pCi/g	11/20/20 19:07	12/13/20 12:50	1

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Client Sample Results

Page 84 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-023

Lab Sample ID: 160-40423-23

Matrix: Solid

Date Collected: 11/11/20 13:43

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-212	-0.584	U	0.486	0.490		0.661	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Bismuth-214	0.278		0.102	0.106		0.0489	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Cesium-137	-0.0488	U	0.0807	0.0809	0.0700	0.0637	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Lead-210	0.534	U	1.19	1.19		0.949	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Lead-212	0.437		0.0789	0.0971		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Lead-214	0.451		0.110	0.119		0.0481	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Potassium-40	8.14		1.20	1.46		0.268	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Protactinium-231	-0.793	U	2.52	2.52		2.05	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Protactinium-234	0.0673	U	0.240	0.240		0.196	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Radium-226	0.278		0.102	0.106	0.200	0.0489	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Radium-228	0.361		0.147	0.152		0.107	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Thallium-208	0.201		0.0526	0.0566		0.0165	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Thorium 228	0.437		0.0789	0.0971		0.0335	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Thorium-232	0.361		0.147	0.152		0.107	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Thorium-234	-0.309	U	0.966	0.966		0.788	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Uranium-235	0.0501	U	0.185	0.185		0.340	pCi/g	11/20/20 19:07	12/13/20 12:50	1
Uranium-238	-0.309	U	0.966	0.966		0.788	pCi/g	11/20/20 19:07	12/13/20 12:50	1

Client Sample ID: HPPG-ESU-TU077A-024

Lab Sample ID: 160-40423-24

Matrix: Solid

Date Collected: 11/11/20 13:46

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.389		0.229	0.232		0.0876	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Actinium-227	-0.314	U	0.621	0.622		0.372	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Bismuth-212	0.000	U	0.562	0.562		0.771	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Bismuth-214	0.460		0.127	0.136		0.0426	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Cesium-137	-0.0352	U	0.110	0.110	0.0700	0.0885	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-210	0.393	U	1.42	1.42		1.02	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-212	0.552		0.105	0.120		0.0467	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-214	0.522		0.120	0.132		0.0620	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Potassium-40	10.1		1.73	2.01		0.246	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-231	-0.0717	U	3.00	3.00		2.47	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-234	-0.0371	U	0.113	0.113		0.257	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Radium-226	0.460		0.127	0.136	0.200	0.0426	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Radium-228	0.389		0.229	0.232		0.0876	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thallium-208	0.105		0.0889	0.0895		0.0441	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thorium 228	0.552		0.105	0.120		0.0467	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thorium-232	0.389		0.229	0.232		0.0876	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thorium-234	0.667		0.562	0.567		0.431	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Uranium-235	0.0697	U	0.157	0.157		0.417	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Uranium-238	0.667		0.562	0.567		0.431	pCi/g	11/20/20 20:10	12/13/20 15:52	1

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Client Sample Results

Page 85 of 110

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40423-1
 SDG: GJ46599771

Client Sample ID: HPPG-ESU-TU077A-025
Lab Sample ID: 160-40423-25

Date Collected: 11/11/20 13:49

Matrix: Solid

Date Received: 11/17/20 09:05

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.602		0.193	0.202		0.0654	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Actinium-227	0.137	U	0.372	0.372		0.343	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Bismuth-212	-0.0956	U	0.787	0.787		0.575	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Bismuth-214	0.510		0.105	0.117		0.0125	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Cesium-137	-0.0461	U	0.0781	0.0782	0.0700	0.0613	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Lead-210	0.665	U	1.20	1.20		0.844	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Lead-212	0.447		0.0929	0.109		0.0473	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Lead-214	0.480		0.112	0.123		0.0440	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Potassium-40	7.60		1.23	1.45		0.291	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Protactinium-231	0.000	U	0.752	0.752		2.13	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Protactinium-234	0.202		0.121	0.122		0.179	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Radium-226	0.510		0.105	0.117	0.200	0.0125	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Radium-228	0.602		0.193	0.202		0.0654	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Thallium-208	0.137		0.0572	0.0589		0.0253	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Thorium 228	0.447		0.0929	0.109		0.0473	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Thorium-232	0.602		0.193	0.202		0.0654	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Thorium-234	0.385		0.425	0.427		0.355	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Uranium-235	0.199	U	0.313	0.313		0.237	pCi/g	11/20/20 20:10	12/13/20 15:49	1
Uranium-238	0.385		0.425	0.427		0.355	pCi/g	11/20/20 20:10	12/13/20 15:49	1

Client Sample ID: HPPG-F-033
Lab Sample ID: 160-40423-26

Date Collected: 11/11/20 13:03

Matrix: Solid

Date Received: 11/17/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	0.00140	U	0.116	0.116	0.331	0.0952	pCi/g	12/16/20 14:29	01/04/21 13:55	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	92.1		40 - 110					12/16/20 14:29	01/04/21 13:55	1
Y Carrier	93.1		40 - 110					12/16/20 14:29	01/04/21 13:55	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.396		0.164	0.169		0.0731	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Actinium-227	0.0413	U	0.160	0.160		0.323	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Bismuth-212	-0.00361	U	0.652	0.652		0.655	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Bismuth-214	-0.0121	U	0.0736	0.0736		0.171	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Cesium-137	0.00125	U	0.0525	0.0525	0.0700	0.0429	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Lead-210	-0.0256	U	1.31	1.31		0.926	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Lead-212	0.433		0.0889	0.105		0.0401	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Lead-214	0.350		0.120	0.125		0.0638	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Potassium-40	7.92		1.52	1.73		0.391	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Protactinium-231	0.000	U	1.14	1.14		2.01	pCi/g	11/20/20 20:10	12/13/20 15:50	1

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Client Sample Results

Page 86 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Client Sample ID: HPPG-F-033

Date Collected: 11/11/20 13:03

Date Received: 11/17/20 09:05

Lab Sample ID: 160-40423-26

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Protactinium-234	0.0738	U	0.180	0.180		0.153	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Radium-226	-0.0121	U	0.0736	0.0736	0.200	0.171	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Radium-228	0.396		0.164	0.169		0.0731	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Thallium-208	0.199		0.0580	0.0616		0.0177	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Thorium 228	0.433		0.0889	0.105		0.0401	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Thorium-232	0.396		0.164	0.169		0.0731	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Thorium-234	0.437		0.460	0.463		0.292	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Uranium-235	-0.0160	U	0.210	0.210		0.216	pCi/g	11/20/20 20:10	12/13/20 15:50	1
Uranium-238	0.437		0.460	0.463		0.292	pCi/g	11/20/20 20:10	12/13/20 15:50	1

Client Sample ID: HPPG-F-034

Date Collected: 11/11/20 13:32

Date Received: 11/17/20 09:05

Lab Sample ID: 160-40423-27

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.614		0.128	0.142		0.0234	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Actinium-227	0.235	U	0.468	0.469		0.269	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Bismuth-212	0.868		0.427	0.436		0.156	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Bismuth-214	0.380		0.102	0.109		0.0411	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Cesium-137	-0.00706	U	0.0479	0.0479	0.0700	0.0388	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-210	-0.352	U	1.32	1.32		1.07	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-212	0.503		0.0797	0.103		0.0285	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Lead-214	0.470		0.0948	0.107		0.0427	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Potassium-40	8.94		1.24	1.54		0.262	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-231	-0.801	U	2.50	2.50		2.03	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Protactinium-234	0.0573	U	0.206	0.206		0.167	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Radium-226	0.380		0.102	0.109	0.200	0.0411	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Radium-228	0.614		0.128	0.142		0.0234	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thallium-208	0.158		0.0457	0.0486		0.0149	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thorium 228	0.503		0.0797	0.103		0.0285	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thorium-232	0.614		0.128	0.142		0.0234	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Thorium-234	-0.345	U	1.19	1.19		0.971	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Uranium-235	0.168	U	0.370	0.370		0.359	pCi/g	11/20/20 20:10	12/13/20 15:52	1
Uranium-238	-0.345	U	1.19	1.19		0.971	pCi/g	11/20/20 20:10	12/13/20 15:52	1

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QC Sample Results

Page 87 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-492111/22-A

Matrix: Solid

Analysis Batch: 493835

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 492111

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.					
Strontium-90	-0.03798	U		0.125	0.125	0.331	pCi/g	12/16/20 14:29	01/04/21 13:58	1
Carrier										
<i>Sr Carrier</i>										
<i>%Yield</i>		<i>MB</i>	<i>MB</i>	<i>Qualifier</i>	<i>Limits</i>			<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Sr Carrier</i>		96.8			40 - 110			12/16/20 14:29	01/04/21 13:58	1
<i>Y Carrier</i>		94.6			40 - 110			12/16/20 14:29	01/04/21 13:58	1

Lab Sample ID: LCS 160-492111/1-A

Matrix: Solid

Analysis Batch: 493723

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 492111

Analyte	MB	MB	Qualifier	Spike	LCS	LCS	DLC	Unit	%Rec.	Limits
	Result	Uncert.		(2σ+/-)	Result	Qual				
Strontium-90				7.75	6.756		0.712	0.331	87	75 - 125
Carrier										
<i>Sr Carrier</i>										
<i>%Yield</i>		<i>MB</i>	<i>MB</i>	<i>Qualifier</i>	<i>Limits</i>					
<i>Sr Carrier</i>		102			40 - 110					
<i>Y Carrier</i>		94.6			40 - 110					

Lab Sample ID: MB 160-493370/23-A

Matrix: Solid

Analysis Batch: 494269

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 493370

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Result					
Strontium-90	0.01492	U		0.148	0.148	0.331	pCi/g	12/29/20 21:17	01/07/21 16:12	1
Carrier										
<i>Sr Carrier</i>										
<i>%Yield</i>		<i>MB</i>	<i>MB</i>	<i>Qualifier</i>	<i>Limits</i>			<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Sr Carrier</i>		103			40 - 110			12/29/20 21:17	01/07/21 16:12	1
<i>Y Carrier</i>		84.9			40 - 110			12/29/20 21:17	01/07/21 16:12	1

Lab Sample ID: LCS 160-493370/1-A

Matrix: Solid

Analysis Batch: 494260

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 493370

Analyte	MB	MB	Qualifier	Spike	LCS	LCS	DLC	Unit	%Rec.	Limits
	Result	Uncert.		(2σ+/-)	Result	Qual				
Strontium-90				7.75	6.391		0.695	0.331	82	75 - 125
Carrier										
<i>Sr Carrier</i>										
<i>%Yield</i>		<i>MB</i>	<i>MB</i>	<i>Qualifier</i>	<i>Limits</i>					
<i>Sr Carrier</i>		102			40 - 110					
<i>Y Carrier</i>		87.1			40 - 110					

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QC Sample Results

Page 88 of 110

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parse G 501197

Job ID: 160-40423-1
 SDG: GJ46599771

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-489912/1-A

Matrix: Solid

Analysis Batch: 491636

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 489912

Analyte	Result	MB	MB	Count Uncert.		Total Uncert.		DLC	Unit	Prepared	Analyzed	Dil Fac
				(2σ+/-)	(2σ+/-)	LOQ						
Actinium 228	-0.0006816	U	U	0.207	0.207	0.115	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Actinium-227	0.03531	U	U	0.0781	0.0782	0.342	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Bismuth-212	-0.03201	U	U	0.844	0.844	0.692	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Bismuth-214	-0.2024	U	U	0.135	0.137	0.288	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Cesium-137	0.0000	U	U	0.0332	0.0332	0.0345	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Lead-210	0.4397	U	U	1.20	1.21	0.935	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Lead-212	0.01072	U	U	0.101	0.101	0.0815	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Lead-214	-0.09834	U	U	0.290	0.290	0.123	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Potassium-40	-1.193	U	U	1.05	1.05	0.872	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Protactinium-231	-1.070	U	U	3.65	3.65	2.97	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Protactinium-234	0.07615	U	U	0.205	0.205	0.164	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Radium-226	-0.2024	U	U	0.135	0.137	0.200	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Radium-228	-0.0006816	U	U	0.207	0.207	0.115	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Thallium-208	-0.04592	U	U	0.0575	0.0577	0.0528	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Thorium 228	0.01072	U	U	0.101	0.101	0.0815	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Thorium-232	-0.0006816	U	U	0.207	0.207	0.115	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Thorium-234	-0.6086	U	U	0.743	0.746	0.909	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Uranium-235	-0.1711	U	U	0.329	0.329	0.371	pCi/g	11/20/20 19:07	12/13/20 12:14		1	
Uranium-238	-0.6086	U	U	0.743	0.746	0.909	pCi/g	11/20/20 19:07	12/13/20 12:14		1	

Lab Sample ID: LCS 160-489912/2-A

Matrix: Solid

Analysis Batch: 491639

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 489912

Analyte	Spike Added	LCS		Total Uncert.		DLC	Unit	%Rec	%Rec Limits
		Result	Qual	(2σ+/-)	LOQ				
Americium-241	96.4	96.62		10.2		0.593	pCi/g	100	87 - 116
Cesium-137	26.7	27.08		2.92	0.0700	0.0924	pCi/g	101	87 - 120
Cobalt-60	9.47	9.320		1.01		0.0186	pCi/g	98	87 - 115

Lab Sample ID: 160-40423-23 DU

Matrix: Solid

Analysis Batch: 491630

Client Sample ID: HPPG-ESU-TU077A-023

Prep Type: Total/NA

Prep Batch: 489912

Analyte	Sample		DU		Total Uncert.		DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	(2σ+/-)	LOQ				
Actinium 228	0.361		0.2358		0.250		0.129	pCi/g	0.31	1
Actinium-227	-0.190	U	0.2097	U	0.423		0.309	pCi/g	0.31	1
Bismuth-212	-0.584	U	0.5622	U	1.08		0.847	pCi/g	0.73	1
Bismuth-214	0.278		0.4109		0.130		0.0495	pCi/g	0.56	1
Cesium-137	-0.0488	U	0.004048	U	0.0614	0.0700	0.0501	pCi/g	0.37	1
Lead-210	0.534	U	-0.7360	U	2.15		1.79	pCi/g	0.38	1
Lead-212	0.437		0.4202		0.114		0.0585	pCi/g	0.08	1
Lead-214	0.451		0.4708		0.144		0.0578	pCi/g	0.07	1
Potassium-40	8.14		8.221		1.59		0.129	pCi/g	0.03	1
Protactinium-231	-0.793	U	-0.8525	U	3.26		2.66	pCi/g	0.01	1
Protactinium-234	0.0673	U	0.06747	U	0.182		0.266	pCi/g	0	1
Radium-226	0.278		0.4109		0.130	0.200	0.0495	pCi/g	0.56	1

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QC Sample Results

Page 89 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-40423-23 DU

Client Sample ID: HPPG-ESU-TU077A-023

Matrix: Solid

Analysis Batch: 491630

Prep Type: Total/NA

Prep Batch: 489912

Analyte	Sample	Sample	DU		DU		Total				RER	Limit
	Result	Qual	Result	Qual	(2σ+/-)	LOQ	DLC	Unit				
Radium-228	0.361		0.2358		0.250		0.129	pCi/g			0.31	1
Thallium-208	0.201		0.1610		0.0909		0.0386	pCi/g			0.27	1
Thorium 228	0.437		0.4202		0.114		0.0585	pCi/g			0.08	1
Thorium-232	0.361		0.2358		0.250		0.129	pCi/g			0.31	1
Thorium-234	-0.309	U	1.149		0.717		0.473	pCi/g			0.87	1
Uranium-235	0.0501	U	0.02965	U	0.0885		0.328	pCi/g			0.07	1
Uranium-238	-0.309	U	1.149		0.717		0.473	pCi/g			0.87	1

Lab Sample ID: MB 160-489913/1-A

Client Sample ID: Method Blank

Matrix: Solid

Analysis Batch: 491636

Prep Type: Total/NA

Prep Batch: 489913

Analyte	MB	MB	Count	Total				Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert.	(2σ+/-)	Uncert.	LOQ	DLC	Unit			
Actinium 228	0.07422	U	0.200	0.201			0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Actinium-227	-0.05999	U	0.582	0.582			0.342	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Bismuth-212	-0.7229	U	1.18	1.18			0.903	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Bismuth-214	-0.005494	U	0.183	0.183			0.150	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Cesium-137	0.01234	U	0.0551	0.0551	0.0700	0.0434	0.0434	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Lead-210	0.5120	U	1.32	1.32			1.03	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Lead-212	-0.05190	U	0.100	0.101			0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Lead-214	0.01041	U	0.107	0.107			0.0942	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Potassium-40	-0.5850	U	0.606	0.609			0.581	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Protactinium-231	0.0000	U	0.234	0.234			1.89	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Protactinium-234	0.04664	U	0.210	0.210			0.201	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Radium-226	-0.005494	U	0.183	0.183	0.200	0.150	0.150	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Radium-228	0.07422	U	0.200	0.201			0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thallium-208	0.04653		0.0294	0.0298			0.0326	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thorium 228	-0.05190	U	0.100	0.101			0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thorium-232	0.07422	U	0.200	0.201			0.115	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Thorium-234	-0.6537	U	0.713	0.717			1.18	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Uranium-235	0.09038	U	0.181	0.182			0.374	pCi/g	11/20/20 20:10	12/13/20 15:47	1
Uranium-238	-0.6537	U	0.713	0.717			1.18	pCi/g	11/20/20 20:10	12/13/20 15:47	1

Lab Sample ID: LCS 160-489913/2-A

Client Sample ID: Lab Control Sample

Matrix: Solid

Analysis Batch: 491634

Prep Type: Total/NA

Prep Batch: 489913

Analyte	Spike	LCS	LCS	Total				%Rec.	Limits	
	Added	Result	Qual	Uncert.	(2σ+/-)	LOQ	DLC	Unit		
Americium-241	96.4	91.25		9.61			0.610	pCi/g	95	87 - 116
Cesium-137	26.7	26.33		2.81	0.0700	0.0656	0.0656	pCi/g	99	87 - 120
Cobalt-60	9.47	9.284		0.983			0.0303	pCi/g	98	87 - 115

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QC Sample Results

Page 90 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197Job ID: 160-40423-1
SDG: GJ46599771

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-489914/1-A

Matrix: Solid

Analysis Batch: 491640

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 489914

Analyte	MB Result	MB Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.06942	U	0.163	0.163		0.106	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Actinium-227	-0.3324	U	0.662	0.663		0.394	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Bismuth-212	0.0000	U	0.133	0.133		0.380	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Bismuth-214	0.001233	U	0.00103	0.00103		0.229	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Cesium-137	-0.03158	U	0.0717	0.0718	0.0700	0.0550	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Lead-210	1.051	U	1.49	1.49		1.13	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Lead-212	-0.02229	U	0.102	0.102		0.0910	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Lead-214	0.006246	U	0.117	0.117		0.0949	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Potassium-40	-0.1884	U	1.06	1.06		0.298	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Protactinium-231	0.2573	U	1.09	1.09		1.60	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Protactinium-234	0.1307	U	0.117	0.118		0.131	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Radium-226	0.001233	U	0.00103	0.00103	0.200	0.229	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Radium-228	0.06942	U	0.163	0.163		0.106	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thallium-208	0.03977		0.0717	0.0719		0.0238	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thorium 228	-0.02229	U	0.102	0.102		0.0910	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thorium-232	0.06942	U	0.163	0.163		0.106	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Thorium-234	-0.6464	U	0.460	0.466		0.423	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Uranium-235	-0.1697	U	0.362	0.362		0.232	pCi/g	11/20/20 21:15	12/13/20 17:39	1
Uranium-238	-0.6464	U	0.460	0.466		0.423	pCi/g	11/20/20 21:15	12/13/20 17:39	1

Lab Sample ID: LCS 160-489914/2-A

Matrix: Solid

Analysis Batch: 491641

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 489914

Analyte	Spike	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec.	
	Added	Result	Qual	Uncert. (2σ+/-)					Limits	Limits
Americium-241	96.4	97.01		10.2		0.573	pCi/g	101	87 - 116	
Cesium-137	26.7	26.73		2.85	0.0700	0.0837	pCi/g	100	87 - 120	
Cobalt-60	9.47	9.164		0.971		0.0522	pCi/g	97	87 - 115	

Lab Sample ID: 160-40423-9 DU

Matrix: Solid

Analysis Batch: 491631

Client Sample ID: HPPG-ESU-TU077A-009

Prep Type: Total/NA

Prep Batch: 489914

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					
Actinium 228	0.787		0.5720		0.178		0.0520	pCi/g	0.49	1
Actinium-227	-0.402	U	0.4040		0.357		0.250	pCi/g	0.66	1
Bismuth-212	0.443	U	-0.2393	U	0.693		0.551	pCi/g	0.43	1
Bismuth-214	0.329		0.04886	U	0.139		0.149	pCi/g	0.91	1
Cesium-137	-0.0116	U	0.01145	U	0.0556	0.0700	0.0449	pCi/g	0.16	1
Lead-210	1.04		-0.5993	U	1.29		1.03	pCi/g	0.62	1
Lead-212	0.511		0.4735		0.104		0.0373	pCi/g	0.16	1
Lead-214	0.416		0.3914		0.106		0.0873	pCi/g	0.1	1
Potassium-40	9.73		9.505		1.58		0.0950	pCi/g	0.06	1
Protactinium-231	0.704	U	0.3579	U	1.32		2.06	pCi/g	0.1	1
Protactinium-234	-0.0977	U	0.07915	U	0.223		0.181	pCi/g	0.37	1
Radium-226	0.329		0.04886	U	0.139	0.200	0.149	pCi/g	0.91	1

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QC Sample Results

Page 91 of 110

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40423-1
 SDG: GJ46599771

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-40423-9 DU
Client Sample ID: HPPG-ESU-TU077A-009
Matrix: Solid
Analysis Batch: 491631
Prep Type: Total/NA
Prep Batch: 489914

Analyte	Sample	Sample	DU	DU	Total		RER	Limit		
	Result	Qual	Result	Qual	(2σ+/-)	LOQ	DLC	Unit		
Radium-228	0.787		0.5720		0.178		0.0520	pCi/g	0.49	1
Thallium-208	0.157		0.1839		0.0594		0.0177	pCi/g	0.21	1
Thorium 228	0.511		0.4735		0.104		0.0373	pCi/g	0.16	1
Thorium-232	0.787		0.5720		0.178		0.0520	pCi/g	0.49	1
Thorium-234	0.507		0.6332	U	0.671		1.01	pCi/g	0.10	1
Uranium-235	0.212	U	0.0000	U	0.139		0.346	pCi/g	0.40	1
Uranium-238	0.507		0.6332	U	0.671		1.01	pCi/g	0.10	1

Lab Sample ID: MB 160-489915/1-A
Client Sample ID: Method Blank
Matrix: Solid
Analysis Batch: 491636
Prep Type: Total/NA
Prep Batch: 489915

Analyte	MB	MB	Count	Total		Prepared	Analyzed	Dil Fac		
	Result	Qualifier	Uncert.	(2σ+/-)	LOQ	DLC	Unit			
Actinium 228	0.08989		0.0971	0.0975		0.0478	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Actinium-227	0.08204	U	0.297	0.297		0.313	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Bismuth-212	0.0000	U	0.405	0.405		0.597	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Bismuth-214	-0.1826	U	0.128	0.130		0.216	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Cesium-137	0.03104	U	0.0912	0.0913	0.0700	0.0722	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Lead-210	-0.2922	U	1.53	1.53		1.27	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Lead-212	0.005306	U	0.0847	0.0847		0.0687	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Lead-214	-0.0009958	U	0.0868	0.0868		0.0701	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Potassium-40	-0.2533	U	0.984	0.984		0.581	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Protactinium-231	0.0000003	U	3.53	3.53		2.91	pCi/g	11/20/20 22:00	12/13/20 11:38	1
	159									
Protactinium-234	-0.1077	U	0.277	0.278		0.224	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Radium-226	-0.1826	U	0.128	0.130	0.200	0.216	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Radium-228	0.08989		0.0971	0.0975		0.0478	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thallium-208	0.006264	U	0.0531	0.0531		0.0326	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thorium 228	0.005306	U	0.0847	0.0847		0.0687	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thorium-232	0.08989		0.0971	0.0975		0.0478	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Thorium-234	-0.6086	U	0.667	0.671		0.949	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Uranium-235	0.09751	U	0.261	0.261		0.332	pCi/g	11/20/20 22:00	12/13/20 11:38	1
Uranium-238	-0.6086	U	0.667	0.671		0.949	pCi/g	11/20/20 22:00	12/13/20 11:38	1

Lab Sample ID: LCS 160-489915/2-A
Client Sample ID: Lab Control Sample
Matrix: Solid
Analysis Batch: 491634
Prep Type: Total/NA
Prep Batch: 489915

Analyte	Spike	LCS	LCS	Total		%Rec.	Limits			
	Added	Result	Qual	Uncert.	(2σ+/-)	LOQ	DLC	Unit	%Rec	
Americium-241	96.4	90.19		9.49			0.569	pCi/g	94	87 - 116
Cesium-137	26.7	26.06		2.78		0.0700	0.0927	pCi/g	97	87 - 120
Cobalt-60	9.47	9.053		0.959			0.0121	pCi/g	96	87 - 115

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QC Sample Results

Page 92 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-40423-15 DU

Client Sample ID: HPPG-ESU-TU077A-015

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 491630

Prep Batch: 489915

Analyte	Sample	Sample	Total				RER	Limit		
	Result	Qual	DU Result	DU Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Actinium 228	0.543		0.7014		0.213		0.0334	pCi/g	0.43	1
Actinium-227	-0.257	U	0.06118	U	0.225		0.412	pCi/g	0.42	1
Bismuth-212	0.310	U	0.2881	U	0.759		0.595	pCi/g	0.02	1
Bismuth-214	0.309		0.4740		0.166		0.0709	pCi/g	0.61	1
Cesium-137	-0.0139	U	0.03675	U	0.0877	0.0700	0.0695	pCi/g	0.38	1
Lead-210	1.01		0.9717	U	1.45		1.03	pCi/g	0.01	1
Lead-212	0.552		0.5200		0.121		0.0528	pCi/g	0.14	1
Lead-214	0.515		0.4095		0.173		0.113	pCi/g	0.38	1
Potassium-40	8.99		9.491		1.74		0.129	pCi/g	0.15	1
Protactinium-231	-0.156	U	0.0000	U	0.567		3.22	pCi/g	0.14	1
Protactinium-234	0.0850	U	0.01819	U	0.0325		0.293	pCi/g	0.24	1
Radium-226	0.309		0.4740		0.166	0.200	0.0709	pCi/g	0.61	1
Radium-228	0.543		0.7014		0.213		0.0334	pCi/g	0.43	1
Thallium-208	0.193		0.1847		0.0746		0.0275	pCi/g	0.07	1
Thorium 228	0.552		0.5200		0.121		0.0528	pCi/g	0.14	1
Thorium-232	0.543		0.7014		0.213		0.0334	pCi/g	0.43	1
Thorium-234	0.930		-1.098	U	0.650		1.06	pCi/g	1.91	1
Uranium-235	0.000	U	0.0000	U	0.174		0.496	pCi/g	0	1
Uranium-238	0.930		-1.098	U	0.650		1.06	pCi/g	1.91	1

QC Association Summary

Page 93 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Rad

Leach Batch: 489450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	Dry and Grind	
160-40423-2	HPPG-ESU-TU077A-002	Total/NA	Solid	Dry and Grind	
160-40423-3	HPPG-ESU-TU077A-003	Total/NA	Solid	Dry and Grind	
160-40423-4	HPPG-ESU-TU077A-004	Total/NA	Solid	Dry and Grind	
160-40423-5	HPPG-ESU-TU077A-005	Total/NA	Solid	Dry and Grind	
160-40423-6	HPPG-ESU-TU077A-006	Total/NA	Solid	Dry and Grind	
160-40423-7	HPPG-ESU-TU077A-007	Total/NA	Solid	Dry and Grind	
160-40423-8	HPPG-ESU-TU077A-008	Total/NA	Solid	Dry and Grind	
160-40423-9	HPPG-ESU-TU077A-009	Total/NA	Solid	Dry and Grind	
160-40423-10	HPPG-ESU-TU077A-010	Total/NA	Solid	Dry and Grind	
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	Dry and Grind	
160-40423-12	HPPG-ESU-TU077A-012	Total/NA	Solid	Dry and Grind	
160-40423-13	HPPG-ESU-TU077A-013	Total/NA	Solid	Dry and Grind	
160-40423-14	HPPG-ESU-TU077A-014	Total/NA	Solid	Dry and Grind	
160-40423-9 DU	HPPG-ESU-TU077A-009	Total/NA	Solid	Dry and Grind	

Leach Batch: 489454

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-15	HPPG-ESU-TU077A-015	Total/NA	Solid	Dry and Grind	
160-40423-16	HPPG-ESU-TU077A-016	Total/NA	Solid	Dry and Grind	
160-40423-17	HPPG-ESU-TU077A-017	Total/NA	Solid	Dry and Grind	
160-40423-18	HPPG-ESU-TU077A-018	Total/NA	Solid	Dry and Grind	
160-40423-19	HPPG-ESU-TU077A-019	Total/NA	Solid	Dry and Grind	
160-40423-20	HPPG-ESU-TU077A-020	Total/NA	Solid	Dry and Grind	
160-40423-21	HPPG-ESU-TU077A-021	Total/NA	Solid	Dry and Grind	
160-40423-22	HPPG-ESU-TU077A-022	Total/NA	Solid	Dry and Grind	
160-40423-23	HPPG-ESU-TU077A-023	Total/NA	Solid	Dry and Grind	
160-40423-24	HPPG-ESU-TU077A-024	Total/NA	Solid	Dry and Grind	
160-40423-25	HPPG-ESU-TU077A-025	Total/NA	Solid	Dry and Grind	
160-40423-26	HPPG-F-033	Total/NA	Solid	Dry and Grind	
160-40423-27	HPPG-F-034	Total/NA	Solid	Dry and Grind	
160-40423-15 DU	HPPG-ESU-TU077A-015	Total/NA	Solid	Dry and Grind	
160-40423-23 DU	HPPG-ESU-TU077A-023	Total/NA	Solid	Dry and Grind	

Prep Batch: 489912

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-16	HPPG-ESU-TU077A-016	Total/NA	Solid	Fill_Geo-21	489454
160-40423-17	HPPG-ESU-TU077A-017	Total/NA	Solid	Fill_Geo-21	489454
160-40423-18	HPPG-ESU-TU077A-018	Total/NA	Solid	Fill_Geo-21	489454
160-40423-19	HPPG-ESU-TU077A-019	Total/NA	Solid	Fill_Geo-21	489454
160-40423-20	HPPG-ESU-TU077A-020	Total/NA	Solid	Fill_Geo-21	489454
160-40423-21	HPPG-ESU-TU077A-021	Total/NA	Solid	Fill_Geo-21	489454
160-40423-22	HPPG-ESU-TU077A-022	Total/NA	Solid	Fill_Geo-21	489454
160-40423-23	HPPG-ESU-TU077A-023	Total/NA	Solid	Fill_Geo-21	489454
MB 160-489912/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489912/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40423-23 DU	HPPG-ESU-TU077A-023	Total/NA	Solid	Fill_Geo-21	489454

Prep Batch: 489913

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-24	HPPG-ESU-TU077A-024	Total/NA	Solid	Fill_Geo-21	489454

Eurofins TestAmerica, St. Louis

QC Association Summary

Page 94 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Rad (Continued)

Prep Batch: 489913 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-25	HPPG-ESU-TU077A-025	Total/NA	Solid	Fill_Geo-21	489454
160-40423-26	HPPG-F-033	Total/NA	Solid	Fill_Geo-21	489454
160-40423-27	HPPG-F-034	Total/NA	Solid	Fill_Geo-21	489454
MB 160-489913/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489913/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 489914

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	Fill_Geo-21	489450
160-40423-2	HPPG-ESU-TU077A-002	Total/NA	Solid	Fill_Geo-21	489450
160-40423-3	HPPG-ESU-TU077A-003	Total/NA	Solid	Fill_Geo-21	489450
160-40423-4	HPPG-ESU-TU077A-004	Total/NA	Solid	Fill_Geo-21	489450
160-40423-5	HPPG-ESU-TU077A-005	Total/NA	Solid	Fill_Geo-21	489450
160-40423-6	HPPG-ESU-TU077A-006	Total/NA	Solid	Fill_Geo-21	489450
160-40423-7	HPPG-ESU-TU077A-007	Total/NA	Solid	Fill_Geo-21	489450
160-40423-8	HPPG-ESU-TU077A-008	Total/NA	Solid	Fill_Geo-21	489450
160-40423-9	HPPG-ESU-TU077A-009	Total/NA	Solid	Fill_Geo-21	489450
MB 160-489914/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489914/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40423-9 DU	HPPG-ESU-TU077A-009	Total/NA	Solid	Fill_Geo-21	489450

Prep Batch: 489915

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-10	HPPG-ESU-TU077A-010	Total/NA	Solid	Fill_Geo-21	489450
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	Fill_Geo-21	489450
160-40423-12	HPPG-ESU-TU077A-012	Total/NA	Solid	Fill_Geo-21	489450
160-40423-13	HPPG-ESU-TU077A-013	Total/NA	Solid	Fill_Geo-21	489450
160-40423-14	HPPG-ESU-TU077A-014	Total/NA	Solid	Fill_Geo-21	489450
160-40423-15	HPPG-ESU-TU077A-015	Total/NA	Solid	Fill_Geo-21	489454
MB 160-489915/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489915/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40423-15 DU	HPPG-ESU-TU077A-015	Total/NA	Solid	Fill_Geo-21	489454

Leach Batch: 491544

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	Dry and Grind	
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	Dry and Grind	

Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-21	HPPG-ESU-TU077A-021	Total/NA	Solid	DPS-7	489454
160-40423-26	HPPG-F-033	Total/NA	Solid	DPS-7	489454
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Prep Batch: 493370

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40423-1	HPPG-ESU-TU077A-001	Total/NA	Solid	DPS-7	491544
160-40423-11	HPPG-ESU-TU077A-011	Total/NA	Solid	DPS-7	491544
MB 160-493370/23-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-493370/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Eurofins TestAmerica, St. Louis

Tracer/Carrier Summary

Page 95 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40423-1
SDG: GJ46599771

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)										
160-40423-1	HPPG-ESU-TU077A-001	101	86.7										
160-40423-11	HPPG-ESU-TU077A-011	95.2	88.2										
160-40423-21	HPPG-ESU-TU077A-021	102	92.7										
160-40423-26	HPPG-F-033	92.1	93.1										
LCS 160-492111/1-A	Lab Control Sample	102	94.6										
LCS 160-493370/1-A	Lab Control Sample	102	87.1										
MB 160-492111/22-A	Method Blank	96.8	94.6										
MB 160-493370/23-A	Method Blank	103	84.9										

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier



Environment Testing America



ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

[Laboratory Job ID: 160-40443-1](#)
Laboratory Sample Delivery Group: D1189463
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/6/2021 5:35:51 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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Ask
The
Expert

Visit us at:

www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	12
QC Association Summary	14
Tracer Carrier Summary	15

Case Narrative

Page 98 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Job ID: 160-40443-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40443-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/17/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 99 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Job ID: 160-40443-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 12.3 C.

STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU077A-B-001 (160-40443-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/23/2020, prepared on 12/16/2020 and analyzed on 01/04/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

The following sample could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: HPPG-ESU-TU077A-B-001 (160-40443-1). The samples contained small rocks.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU077A-B-001 (160-40443-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/23/2020, prepared on 11/25/2020 and analyzed on 12/16/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 490251

The method blank (MB) z-score associated with Prep Batch 160-490251 is within limits and is stored in the level IV raw data. (MB 160-490251/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-032

Page 1 of 2

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwv

Sample Lead: Murri, Andrew
Sample Tech(s): Paul Leblanc

Project Number: 501197

Project Name: G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 11/16/2020

Waybill Number: 495702256078

Test America (St. Louis Lab)

Lab Destination: 13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Preservatives (water)

Preservatives (soil)

of Containers

Matrix

Date

Time

Method

Container Type

SO

1

16 oz. plastic jar

X

X

X

D1189463

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

Gamma Spec (EPA 901.1 M) - Full 21

day in growth gamma

Sample Name/Spec (EPA 901.1 M) - Full 21

Strontium-90 (EPA 905 M0D)

*** Last 3 transfers shown above - Complete list of transfers on last page ***

Page 100 of 110



160-40443 Chain of Custody

1
2
3
4
5
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9
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3
4
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All Transfers for COC 501197RSY-032

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murni, Andrew		11/11/2020 17:08	Locked Storage (RKilpack)		11/11/2020 17:08
Locked Storage (RKilpack)		11/16/2020 14:22	Devin Lewis		11/16/2020 14:22
Devin Lewis		11/16/2020 14:26	SHIPPEDTOLAB		

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40443-1

SDG Number: D1189463

Login Number: 40443**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Mazariegos, Leonel A**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Page 103 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Page 104 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Page 105 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40443-1	HPPG-ESU-TU077A-B-001	Solid	11/11/20 15:34	11/17/20 09:05	

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Eurofins TestAmerica, St. Louis

Client Sample Results

Page 106 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Client Sample ID: HPPG-ESU-TU077A-B-001

Lab Sample ID: 160-40443-1

Matrix: Solid

Date Collected: 11/11/20 15:34

Date Received: 11/17/20 09:05

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0903	U	0.151	0.151	0.331	0.131	pCi/g	12/16/20 14:29	01/04/21 13:55	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	96.8		40 - 110					12/16/20 14:29	01/04/21 13:55	1
Y Carrier	94.6		40 - 110					12/16/20 14:29	01/04/21 13:55	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.450		0.139	0.146		0.0238	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Actinium-227	0.126	U	0.524	0.524		0.322	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Bismuth-212	-0.413	U	0.691	0.692		0.629	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Bismuth-214	0.547		0.117	0.130		0.0239	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Cesium-137	0.00825	U	0.0655	0.0655	0.0700	0.0534	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Lead-210	0.552	U	0.938	0.940		0.673	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Lead-212	0.485		0.0831	0.104		0.0349	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Lead-214	0.430		0.100	0.110		0.0384	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Potassium-40	8.76		1.40	1.66		0.413	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Protactinium-231	-0.0000003	U	2.15	2.15		1.77	pCi/g	11/25/20 12:41	12/16/20 09:16	1
		52								
Protactinium-234	0.0737	U	0.181	0.181		0.153	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Radium-226	0.547		0.117	0.130	0.200	0.0239	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Radium-228	0.450		0.139	0.146		0.0238	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Thallium-208	0.163		0.0525	0.0552		0.0203	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Thorium 228	0.485		0.0831	0.104		0.0349	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Thorium-232	0.450		0.139	0.146		0.0238	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Thorium-234	0.560		0.408	0.413		0.311	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Uranium-235	0.000	U	0.0817	0.0817		0.260	pCi/g	11/25/20 12:41	12/16/20 09:16	1
Uranium-238	0.560		0.408	0.413		0.311	pCi/g	11/25/20 12:41	12/16/20 09:16	1

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QC Sample Results

Page 107 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-492111/22-A

Matrix: Solid

Analysis Batch: 493835

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 492111

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.					
Strontium-90	-0.03798	U		0.125	0.125	0.331	pCi/g	12/16/20 14:29	01/04/21 13:58	1
Carrier										
Sr Carrier	MB	MB	Qualifier	Limits		Prepared	Analyzed	Dil Fac		
	%Yield			40 - 110						
Y Carrier	96.8			40 - 110		12/16/20 14:29	01/04/21 13:58	1		
	94.6									

Lab Sample ID: LCS 160-492111/1-A

Matrix: Solid

Analysis Batch: 493723

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 492111

Analyte	MB	MB	Qualifier	Spike	LCS	LCS	Total	DLC	Unit	%Rec.					
	Result	Uncert.		(2σ+/-)	Result	Qual									
Strontium-90	-	U		7.75	6.756		0.712	0.331	pCi/g	87					
Carrier															
Sr Carrier	MB	MB	Qualifier	Limits		Prepared	Analyzed	Dil Fac							
	%Yield			40 - 110											
Y Carrier	102			40 - 110											
	94.6														

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-490251/1-A

Matrix: Solid

Analysis Batch: 491974

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490251

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	(2σ+/-)					
Actinium 228	-0.03597	U		0.172	0.172	0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Actinium-227	0.03931	U		0.411	0.411	0.242	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Bismuth-212	-0.01937	U		0.627	0.627	0.515	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Bismuth-214	0.06141	U		0.0409	0.0414	0.0994	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Cesium-137	0.01744	U		0.0370	0.0370	0.0279	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-210	0.3174	U		0.607	0.608	0.459	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-212	-0.01690	U		0.0232	0.0233	0.0609	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Lead-214	-0.1053	U		0.0728	0.0736	0.0768	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Potassium-40	-0.1420	U		0.809	0.809	0.382	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Protactinium-231	0.0000	U		0.429	0.429	1.77	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Protactinium-234	0.02212	U		0.0198	0.0199	0.189	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Radium-226	0.06141	U		0.0409	0.0414	0.0994	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Radium-228	-0.03597	U		0.172	0.172	0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thallium-208	-0.02237	U		0.0311	0.0311	0.0361	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium 228	-0.01690	U		0.0232	0.0233	0.0609	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium-232	-0.03597	U		0.172	0.172	0.0883	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Thorium-234	0.0000	U		0.196	0.196	0.526	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Uranium-235	0.1380	U		0.255	0.255	0.290	pCi/g	11/25/20 12:41	12/16/20 09:13	1
Uranium-238	0.0000	U		0.196	0.196	0.526	pCi/g	11/25/20 12:41	12/16/20 09:13	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Page 108 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-490251/2-A

Client Sample ID: Lab Control Sample

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 491973

Prep Batch: 490251

Analyte	Spike Added	LCS		Total		DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)	LOQ				
Americium-241	96.4	99.40		11.7		0.609	pCi/g	103	87 - 116
Cesium-137	26.7	30.20		3.17	0.0700	0.105	pCi/g	113	87 - 120
Cobalt-60	9.46	10.09		1.07		0.0489	pCi/g	107	87 - 115

QC Association Summary

Page 109 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Rad

Leach Batch: 489957

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40443-1	HPPG-ESU-TU077A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 490251

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40443-1	HPPG-ESU-TU077A-B-001	Total/NA	Solid	Fill_Geo-21	489957
MB 160-490251/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490251/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40443-1	HPPG-ESU-TU077A-B-001	Total/NA	Solid	DPS-7	489957
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

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Tracer/Carrier Summary

Page 110 of 110

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40443-1
SDG: D1189463

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)									
160-40443-1	HPPG-ESU-TU077A-B-001	96.8	94.6									
LCS 160-492111/1-A	Lab Control Sample	102	94.6									
MB 160-492111/22-A	Method Blank	96.8	94.6									

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier

Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report							
RSY Pad: RSY 1 Use 2	Soil Origin: TU-077B ESU						
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/22/2021						

Systematic Soil Sample Data: RSY 1 Use 2							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU077B-001	1	Systematic	9,645	14,627	0.482	0.0147	0.216
HPPG-ESU-TU077B-002	2	Systematic	8,855	14,627	0.187	-0.0538	N/A
HPPG-ESU-TU077B-003	3	Systematic	6,005	14,627	0.403	0.00587	N/A
HPPG-ESU-TU077B-004	4	Systematic	7,348	14,627	0.483	0.0164	N/A
HPPG-ESU-TU077B-005	5	Systematic	6,806	14,627	0.375	0.0225	N/A
HPPG-ESU-TU077B-006	6	Systematic	7,167	14,627	0.588	-0.0578	N/A
HPPG-ESU-TU077B-007	7	Systematic	6,379	14,627	0.282	0.0119	N/A
HPPG-ESU-TU077B-008	8	Systematic	6,113	14,627	0.413	0.0912	N/A
HPPG-ESU-TU077B-009	9	Systematic	5,687	14,627	0.218	-0.0048	N/A
HPPG-ESU-TU077B-010	10	Systematic	7,074	14,627	0.406	0.0128	N/A
HPPG-ESU-TU077B-011	11	Systematic	6,311	14,627	0.382	-0.0220	0.0144
HPPG-ESU-TU077B-012	12	Systematic	5,903	14,627	0.341	-0.00371	N/A
HPPG-ESU-TU077B-013	13	Systematic	7,539	14,627	0.0859	-0.0180	N/A
HPPG-ESU-TU077B-014	14	Systematic	6,560	14,627	0.110	-0.0315	N/A
HPPG-ESU-TU077B-015	15	Systematic	6,336	14,627	0.315	-0.0398	N/A
HPPG-ESU-TU077B-016	16	Systematic	6,336	14,627	0.427	0.0342	N/A
HPPG-ESU-TU077B-017	17	Systematic	6,541	14,627	0.318	0.0140	N/A
HPPG-ESU-TU077B-018	18	Systematic	7,565	14,627	0.587	-0.0598	N/A
HPPG-ESU-TU077B-019	19	Systematic	7,408	14,627	0.305	-0.0418	N/A
HPPG-ESU-TU077B-020	20	Systematic	7,930	14,627	0.375	-0.0748	N/A
HPPG-ESU-TU077B-021	21	Systematic	6,632	14,627	0.436	0.0219	0.174
HPPG-ESU-TU077B-022	22	Systematic	6,366	14,627	0.279	0.0729	N/A
HPPG-ESU-TU077B-023	23	Systematic	6,088	14,627	0.276	-0.0343	N/A
HPPG-ESU-TU077B-024	24	Systematic	6,918	14,627	0.540	-0.0642	N/A
HPPG-ESU-TU077B-025	25	Systematic	6,548	14,627	-0.0569	0.0430	N/A
Soil Systematic Sample Statistics				²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)	
				Maximum	0.588	0.0912	0.216
				Mean	0.3423	-0.0058	0.1348
				Median	0.375	-0.0037	0.174
				Minimum	-0.0569	-0.0748	0.0144
				Standard Deviation	0.1534	0.0427	N/A

Biased Soil Sample Data: RSY 1 Use 2							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU077B-B-001	1	Biased	12,688	15,658	0.248	-0.0378	-0.0157

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11302020-PG-ROV-359	11/30/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-12022020-PG-JSS-365	12/02/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-12012020-PG-JSS-362	12/01/2020	3x3	10/09/2021	117648
Biased Sample Survey	HPRS-12022020-PG-JSS-367	12/02/2020	3x3	10/09/2021	117648

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 1 Use 2
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 33 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
2) One-minute static follow-up measurements with the RS-700 were collected at 33 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-46. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 47-80). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for ⁹⁰ Strontium. Strontium-90 results are also included in the TestAmerica sample results report (pages 47-80). Samples HPPG-F-033 and HPPG-F-034 are field duplicates, correlating to systematic samples -001 and -017. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 81-95). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
Conclusions:
In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.
RSY 1 Use 2 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-077B ESU.
APTIM requests RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be used as backfill for TU-077.

Soil Scan Statistics

Statistical Summary

Dataset		PG-RSY-01-U2				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		4.01	34.07	16.30	16.04	4.22
ROI-06		58.14	153.34	101.64	101.23	14.19
ROI-07		44.10	119.26	77.18	77.15	11.64
ROI-08		79.16	188.46	128.89	128.29	16.65
ROI-10		2,065.57	3,164.48	2,666.52	2,647.60	211.99

Statistical Summary Reference Background

TYPE		Scan RBA (Bldg 809)				
ROI		Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	33.08	16.21	16.04	4.13
ROI-06		68.15	177.45	117.58	117.26	15.50
ROI-07		51.11	141.33	92.34	91.24	13.43
ROI-08		93.19	221.48	146.24	145.30	18.21
ROI-10		2,354.11	3,845.31	2,995.57	2,989.64	255.66

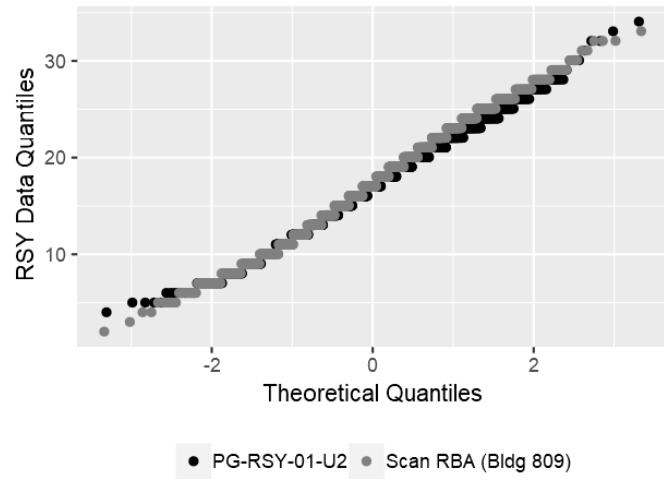
cps = counts per second

Dataset	Number of Data Points
PG-RSY-01-U2	2742
Scan RBA (Bldg 809)	4632

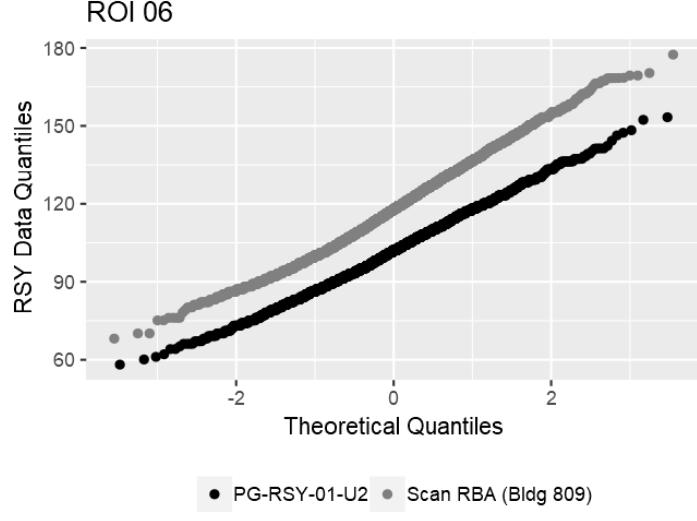
Soil Scan Statistics

Normal Q-Q Plots

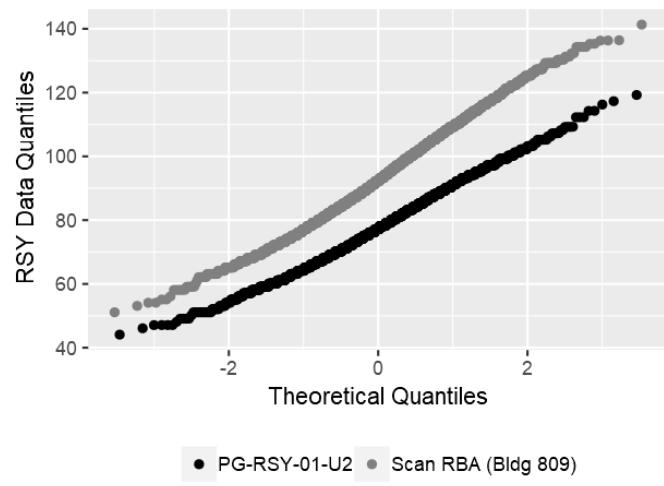
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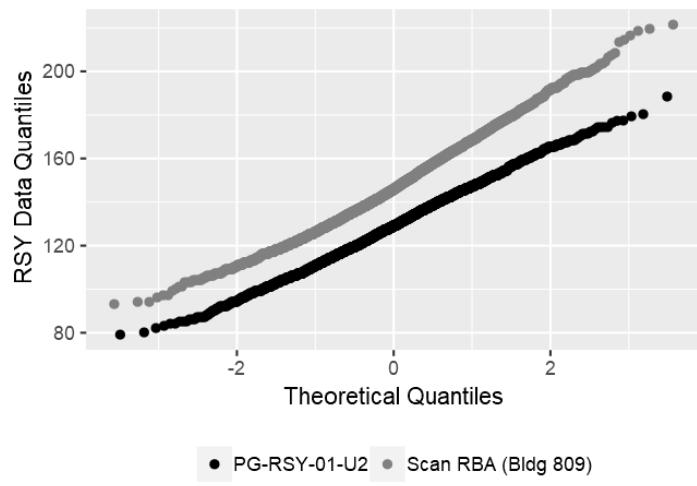
ROI 06



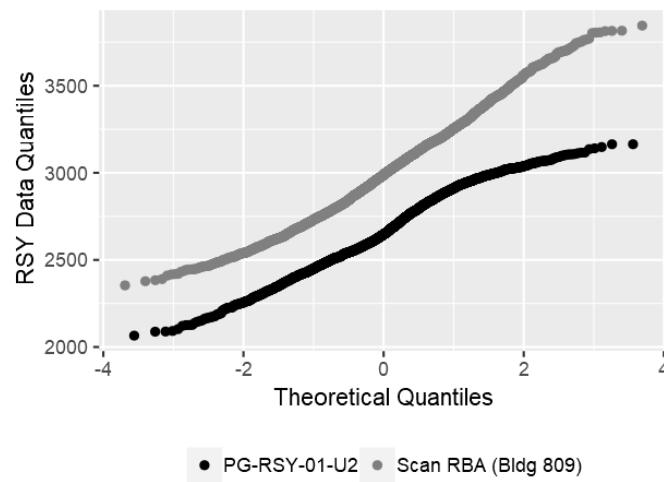
ROI 07



ROI 08

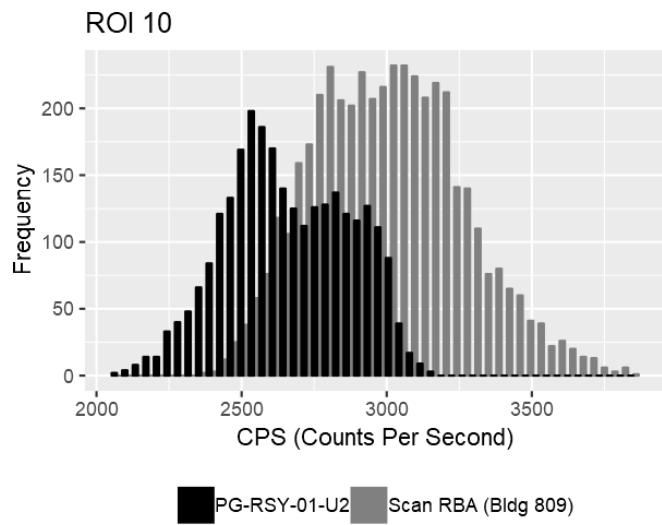
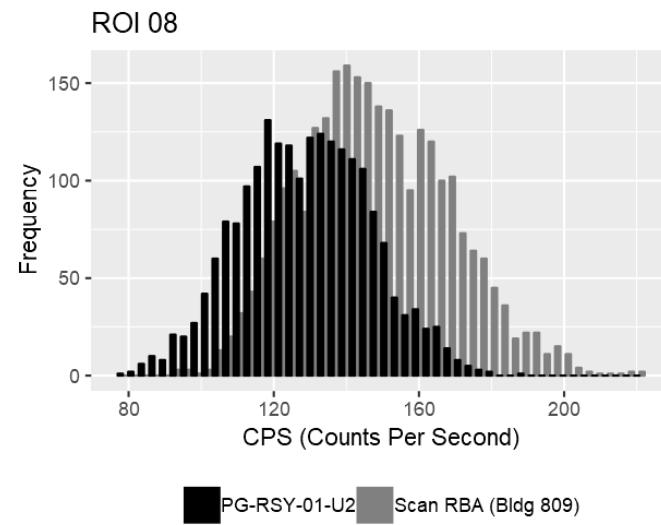
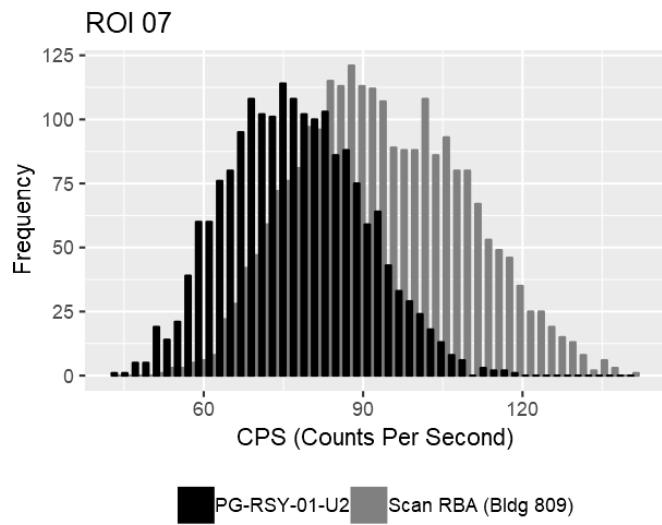
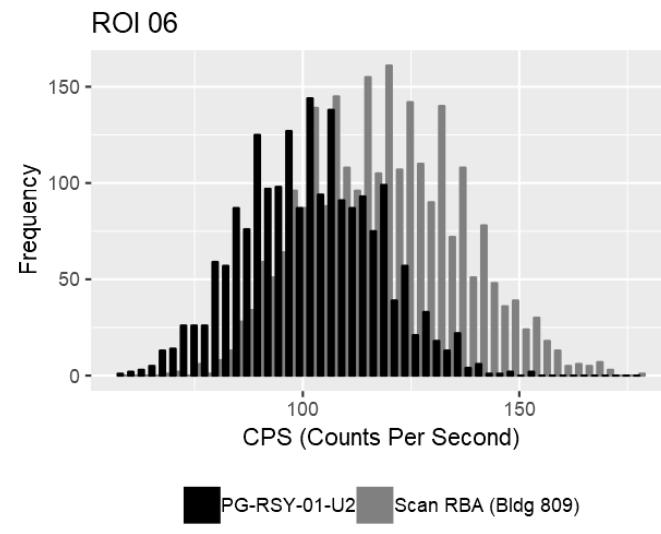
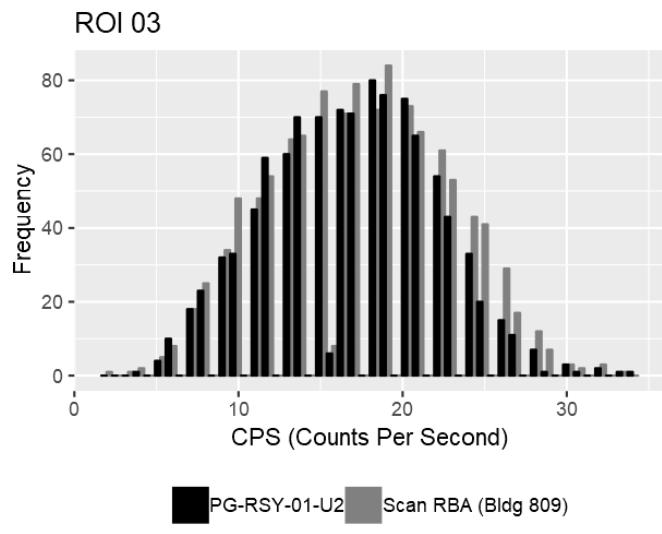


ROI 10



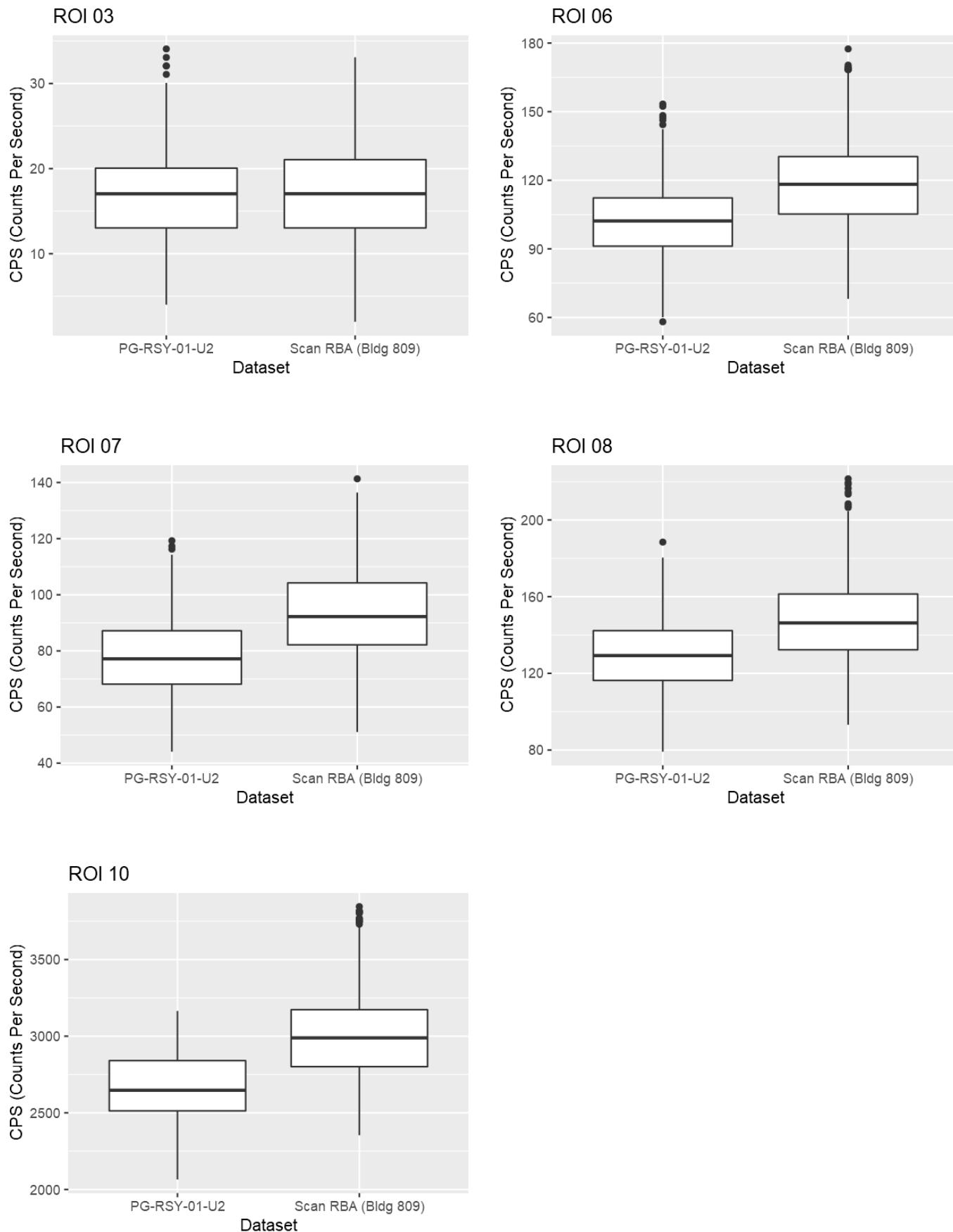
Soil Scan Statistics

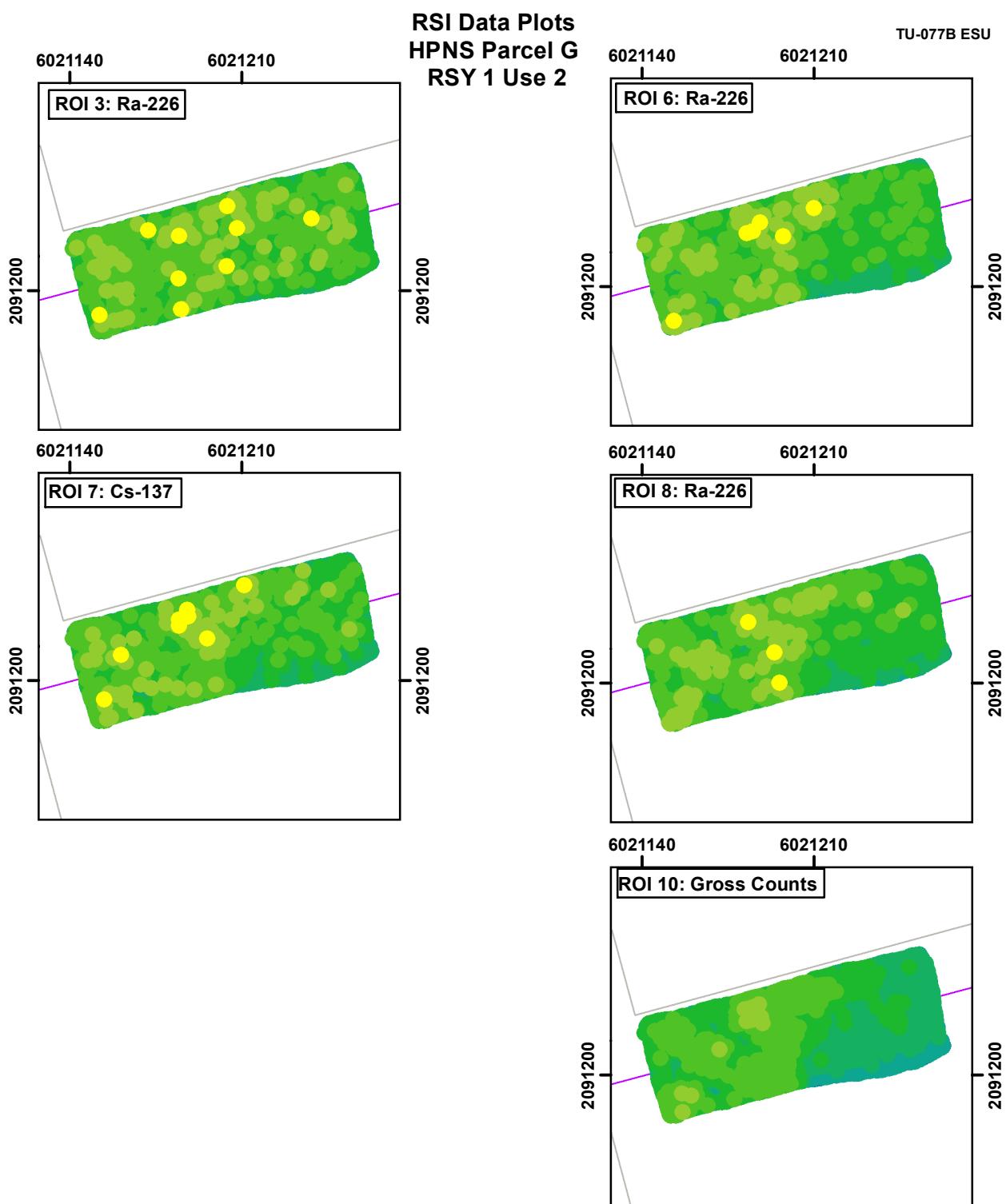
Histograms



Soil Scan Statistics

Box Plots





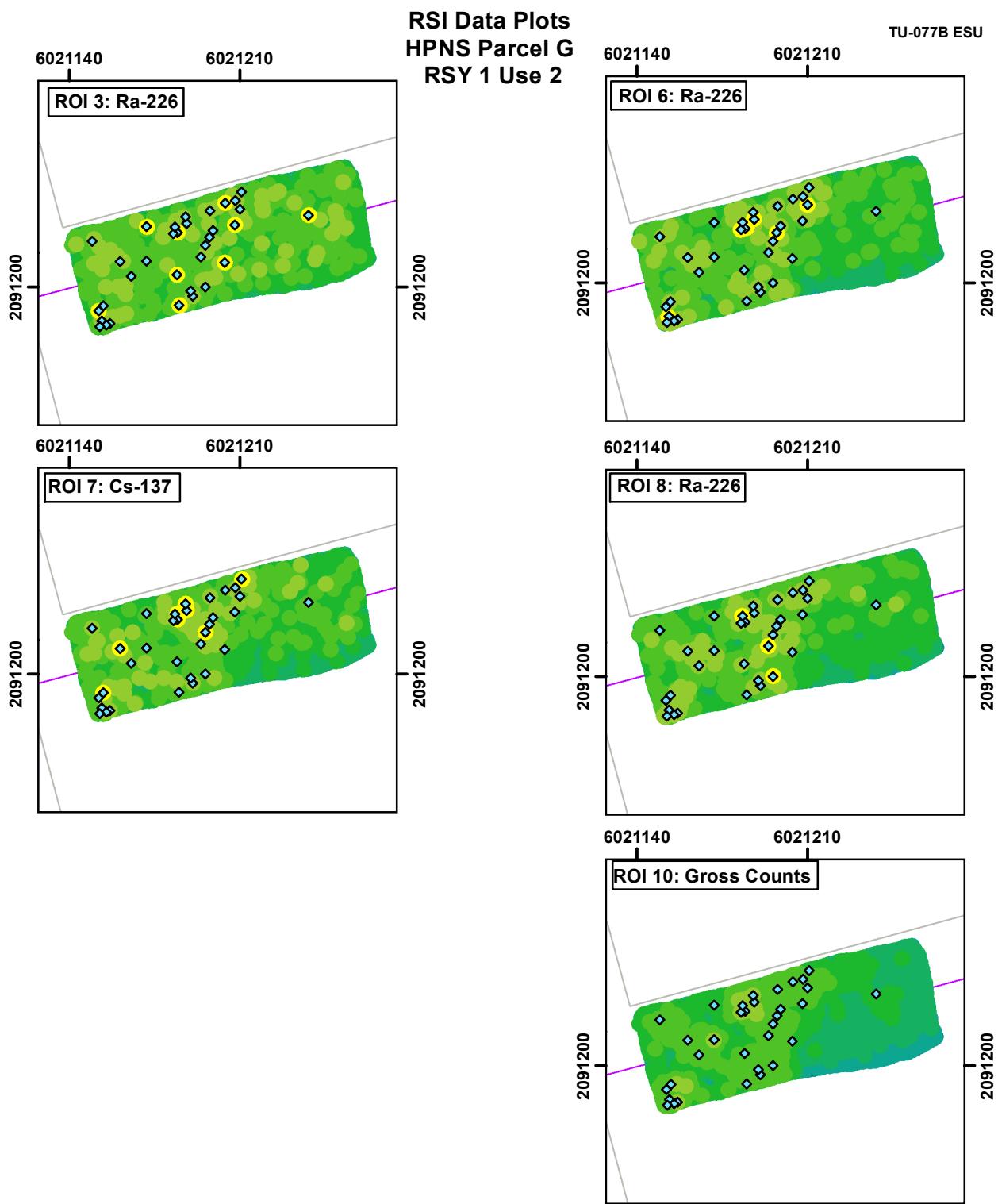
RS 700 Gamma Walkover Survey Data (VD1)

- | | |
|---|--|
| Yellow circle: > 3 std dev | Green circle: > -1 to < 0 std dev |
| Light Green circle: > 2 to < 3 std dev | Cyan circle: > -2 to < -1 std dev |
| Medium Green circle: > 1 to < 2 std dev | Dark Cyan circle: > -3 to < -2 std dev |
| Dark Green circle: > 0 to < 1 std dev | Blue circle: < -3 std dev |

0 25 50 100
 Feet
 Coordinate system: CSP Zone III, NAD83, US Survey Foot



APTIM

**RS 700 Gamma Walkover Survey Data (VD1)**

- ◆ Follow-Up Locations
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev
- > 0 to < 1 std dev
- > 1 to < 2 std dev
- > 2 to < 3 std dev
- > 3 std dev

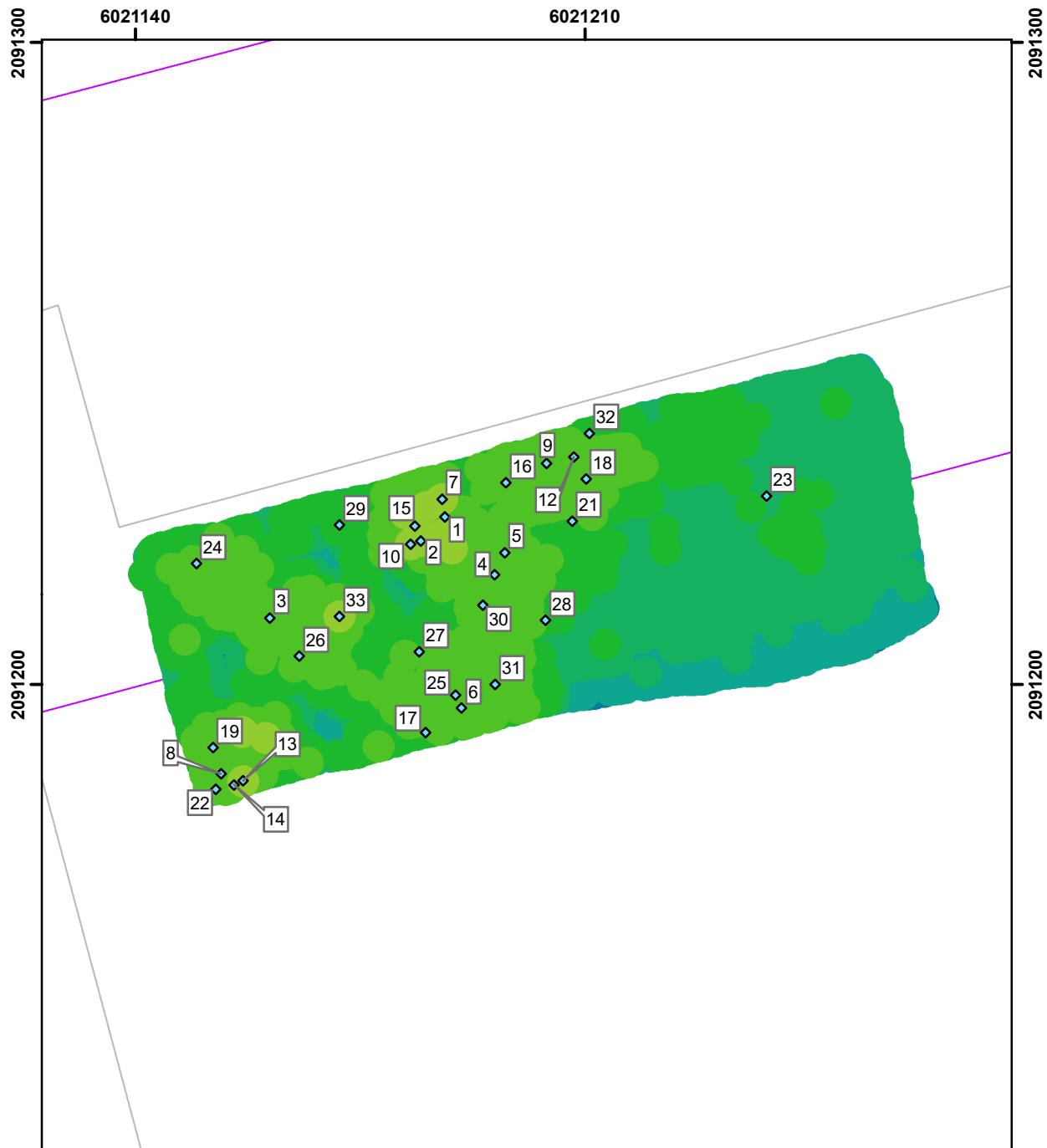
0 25 50 100
 Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot



**Follow-Up Static Survey
HPNS Parcel G
RSY 1 Use 2**

TU-077B ESU



RSY 1 Use 2 (VD1, ROI 10 Gross Gamma)

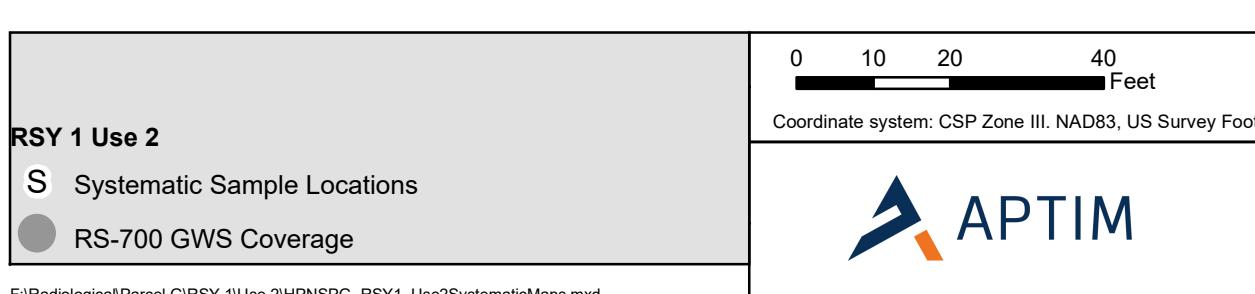
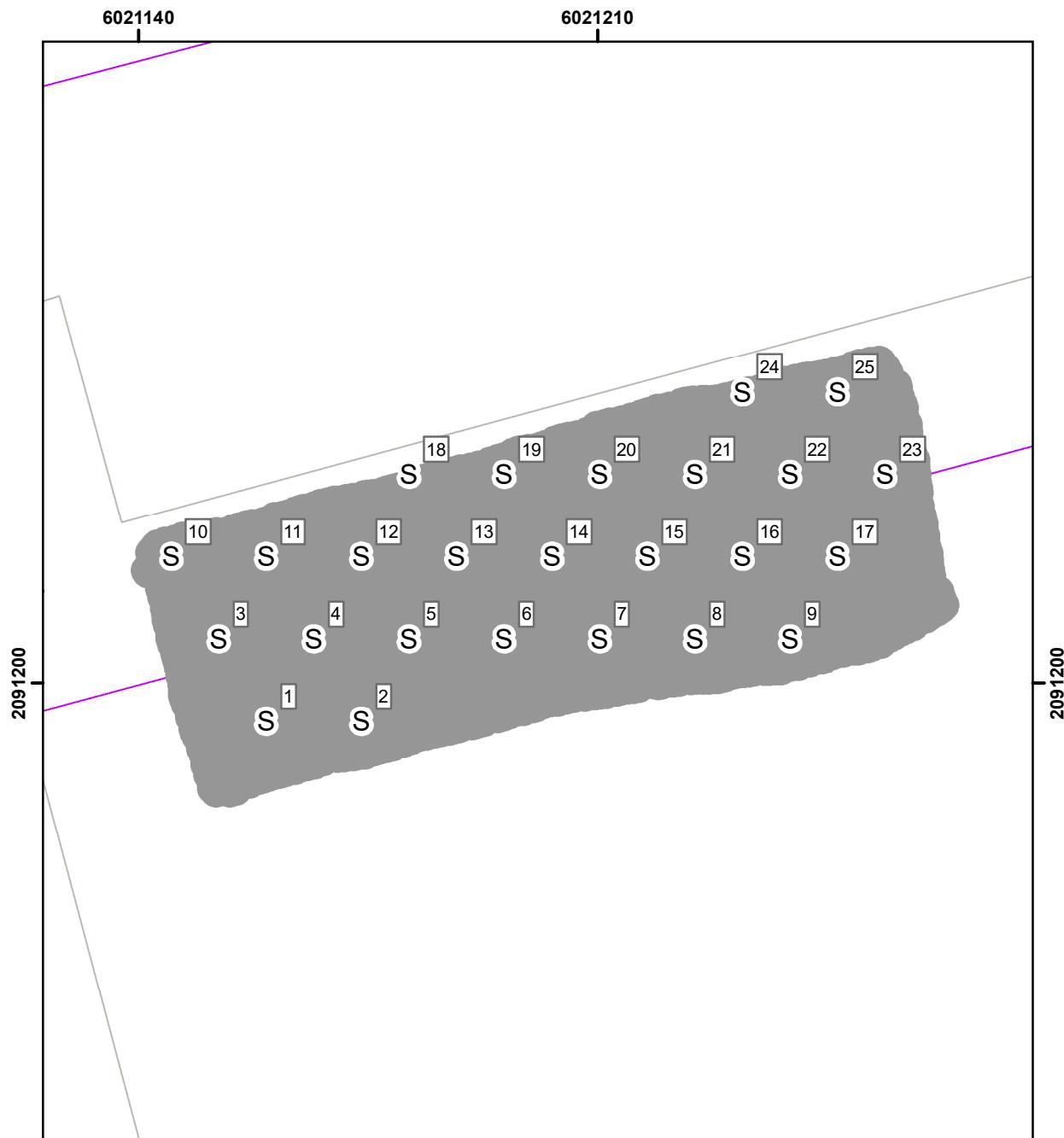
◆ Follow-Up Locations	(Yellow circle) > 3 std dev	(Green circle) > 2 to < 3 std dev	(Green circle) > 0 to < 1 std dev	(Green circle) > -1 to < 0 std dev	(Teal circle) > 1 to < 2 std dev	(Teal circle) > -2 to < -1 std dev	(Dark Blue circle) > -3 to < -2 std dev	(Dark Blue circle) < -3 std dev
-----------------------	-----------------------------	-----------------------------------	-----------------------------------	------------------------------------	----------------------------------	------------------------------------	---	---------------------------------

25 12.5 0 25 Feet
Coordinate system: CSP Zone III. NAD83, US Survey Foot



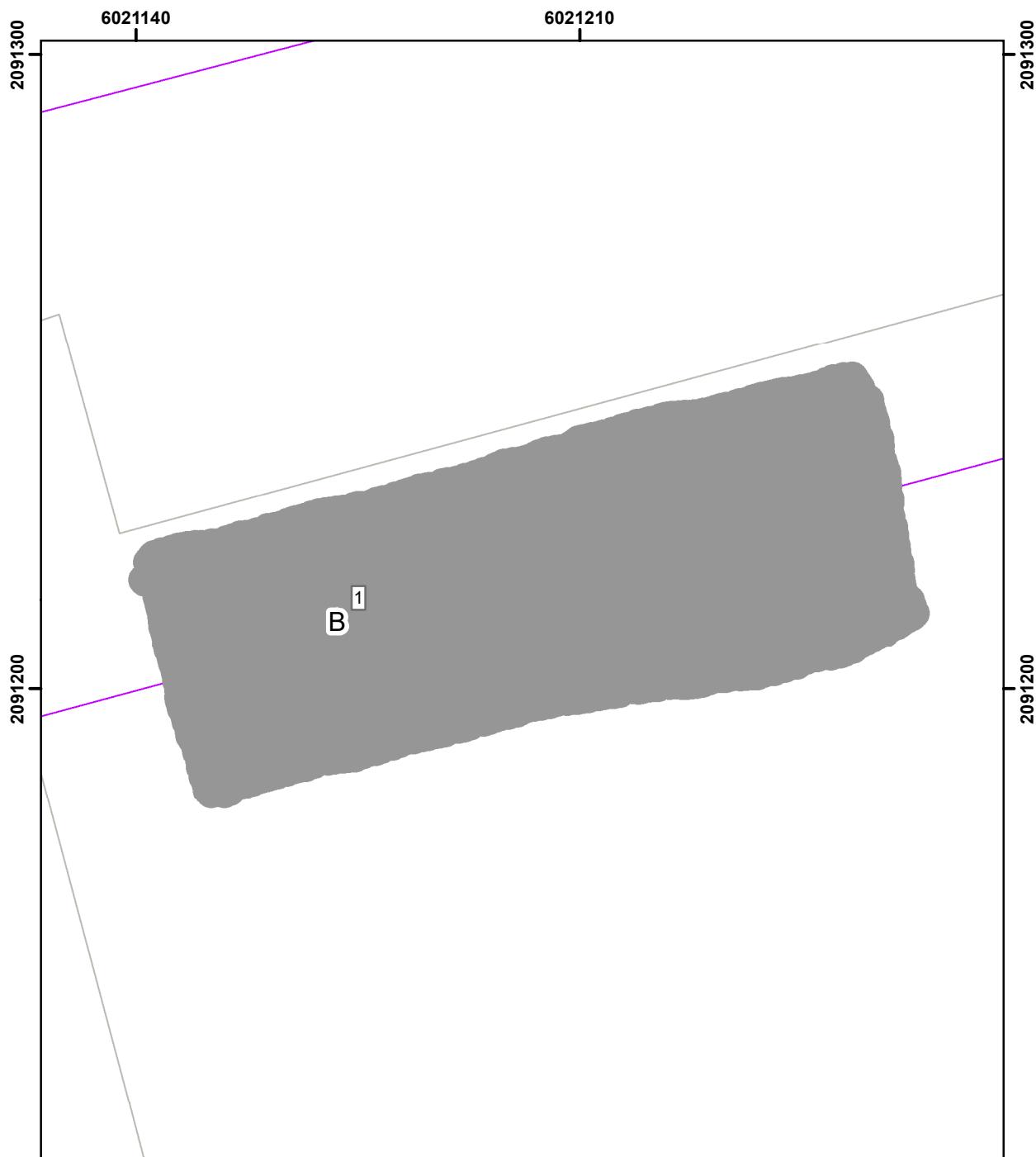
**Systematic Sampling
HPNS Parcel G
RSY 1 Use 2**

TU-077B ESU



**Biased Sampling
HPNS Parcel G
RSY 1 Use 2**

TU-077B ESU



RSY 1 Use 2

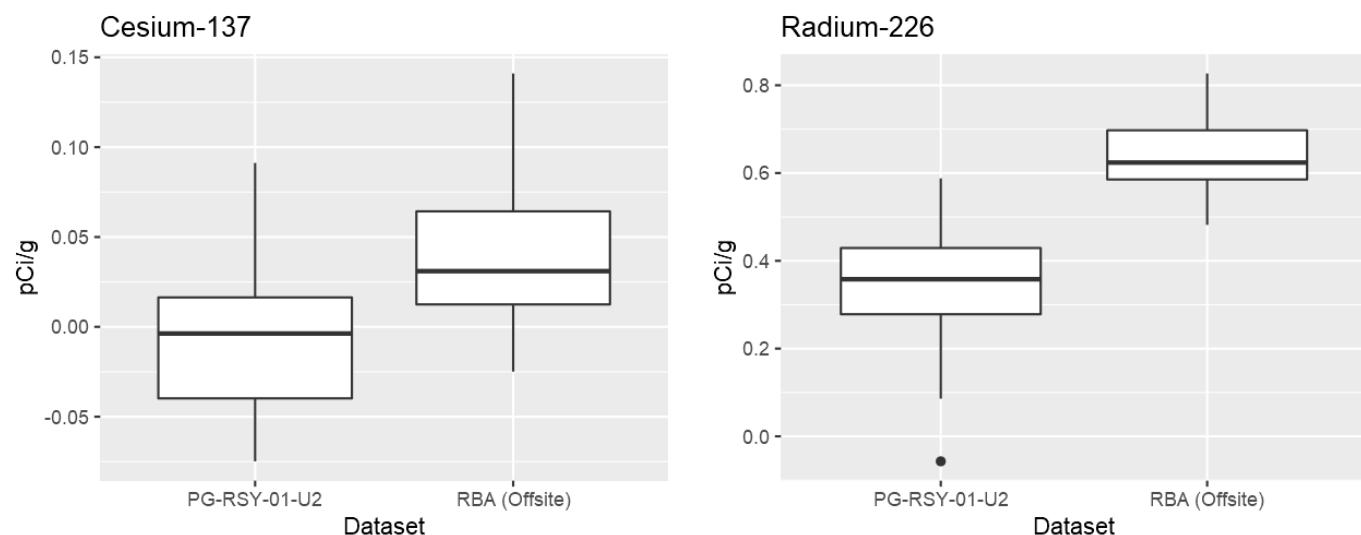
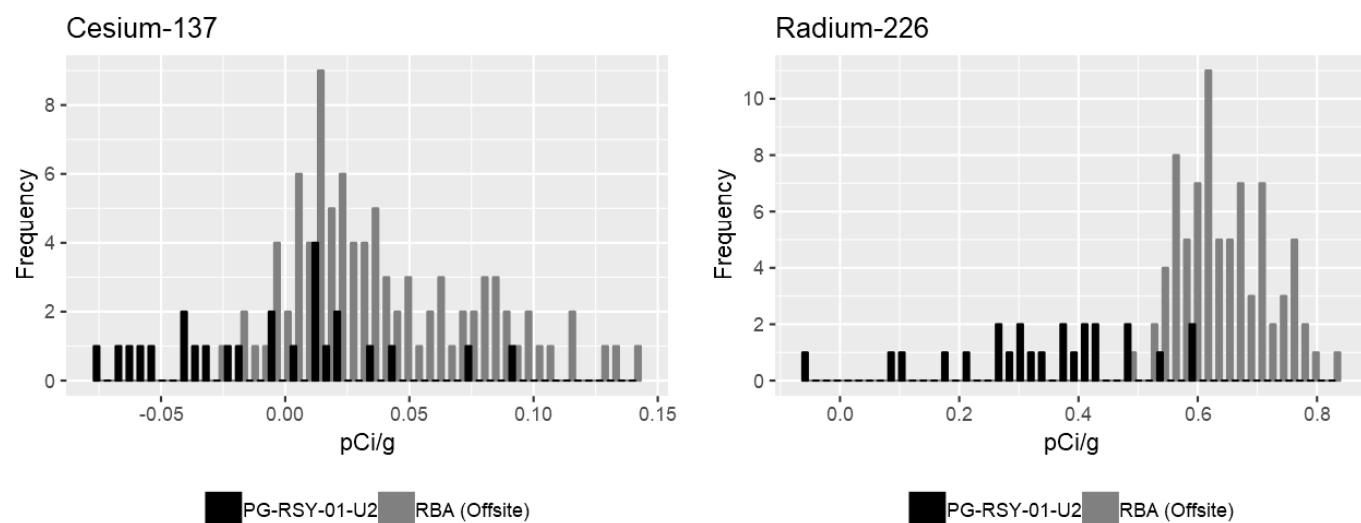
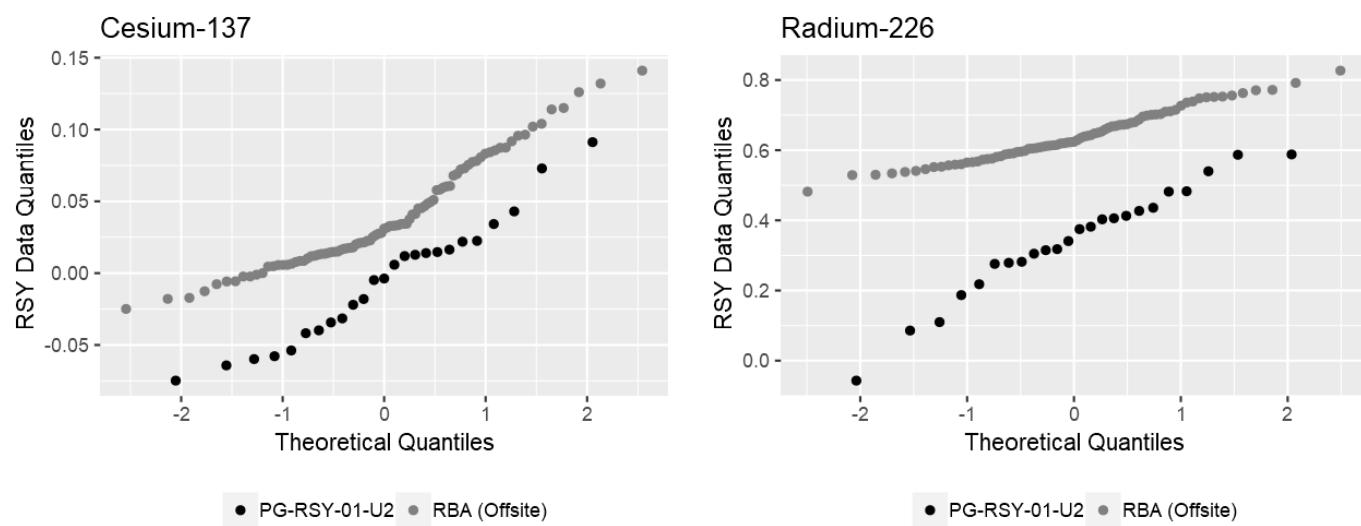
- Biased Sample Location
- RS-700 GWS Coverage

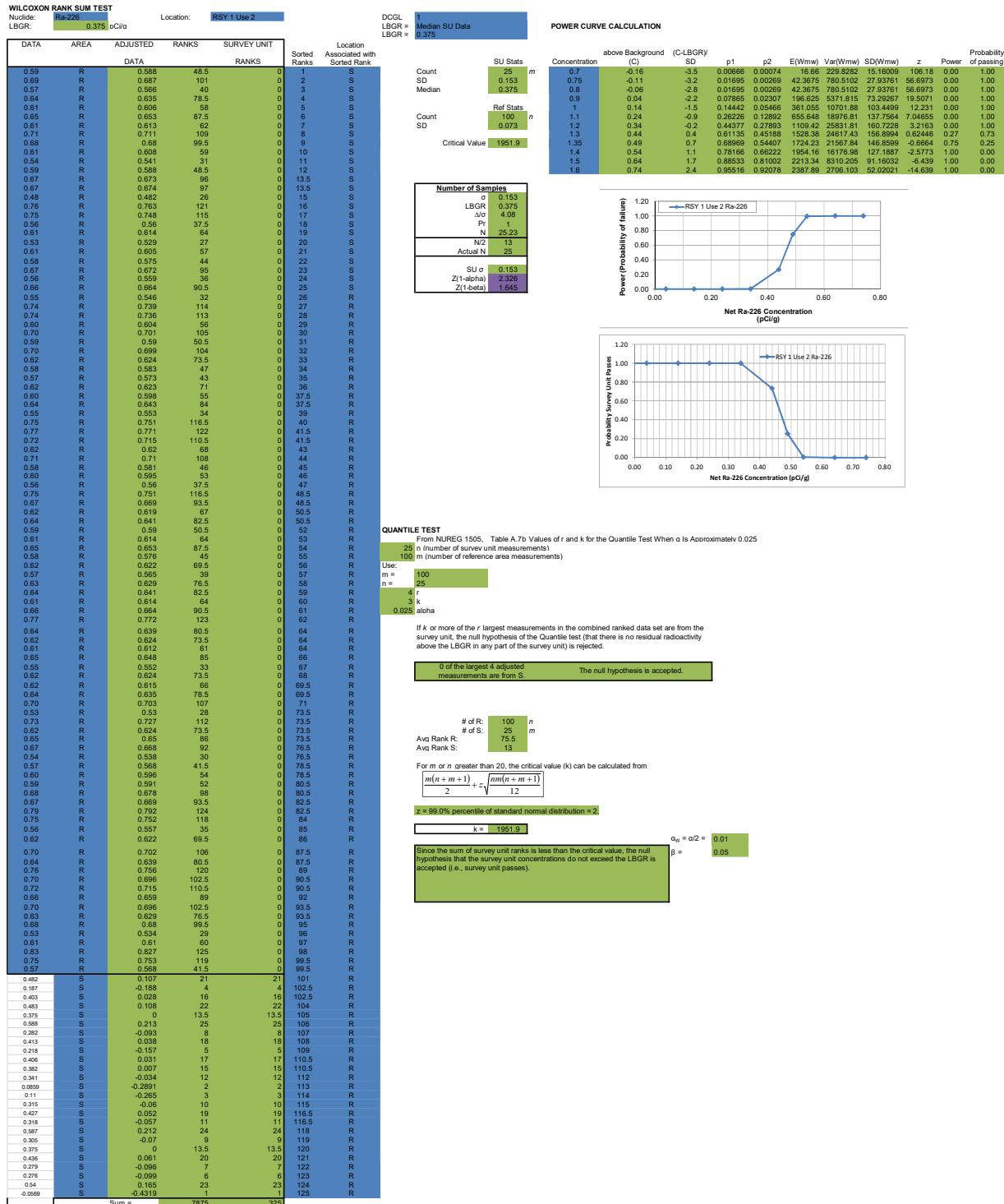
Coordinate system: CSP Zone III. NAD83, US Survey Foot



APTIM

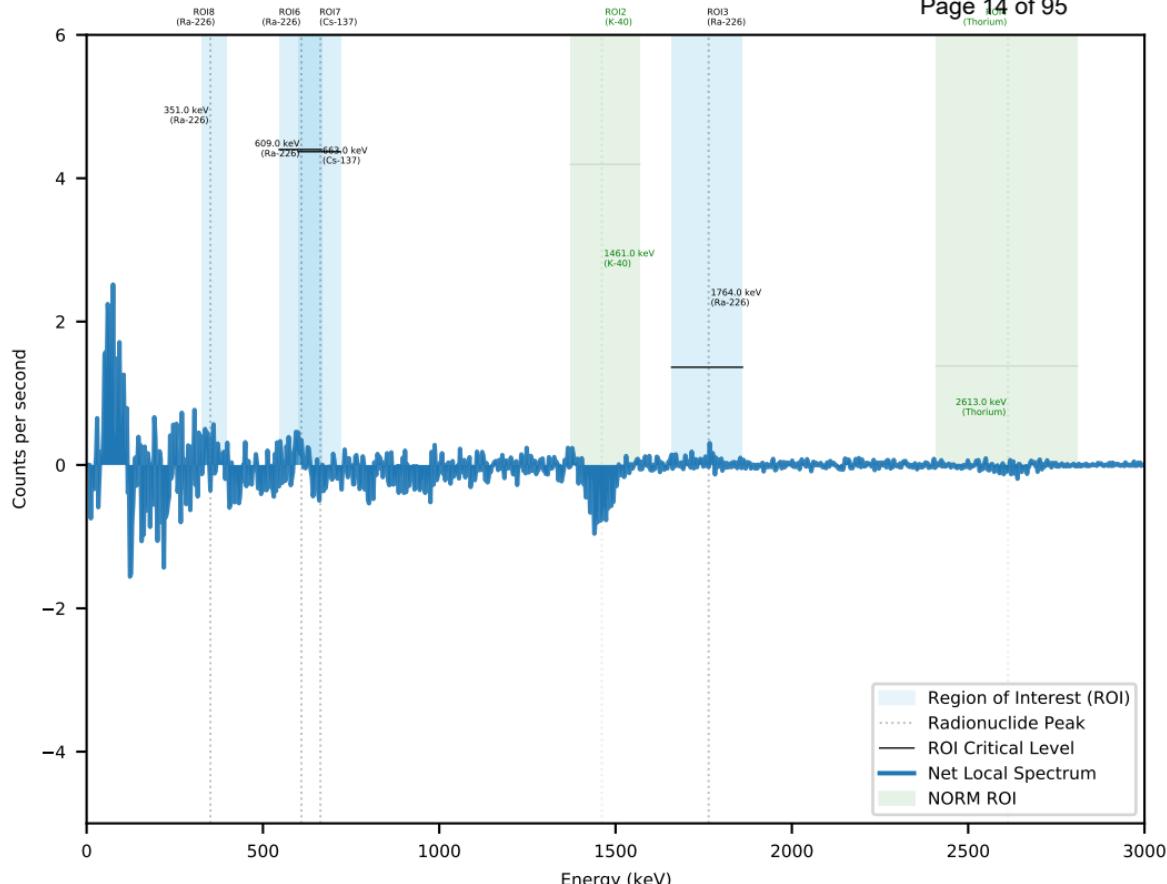
Soil Sample Statistics





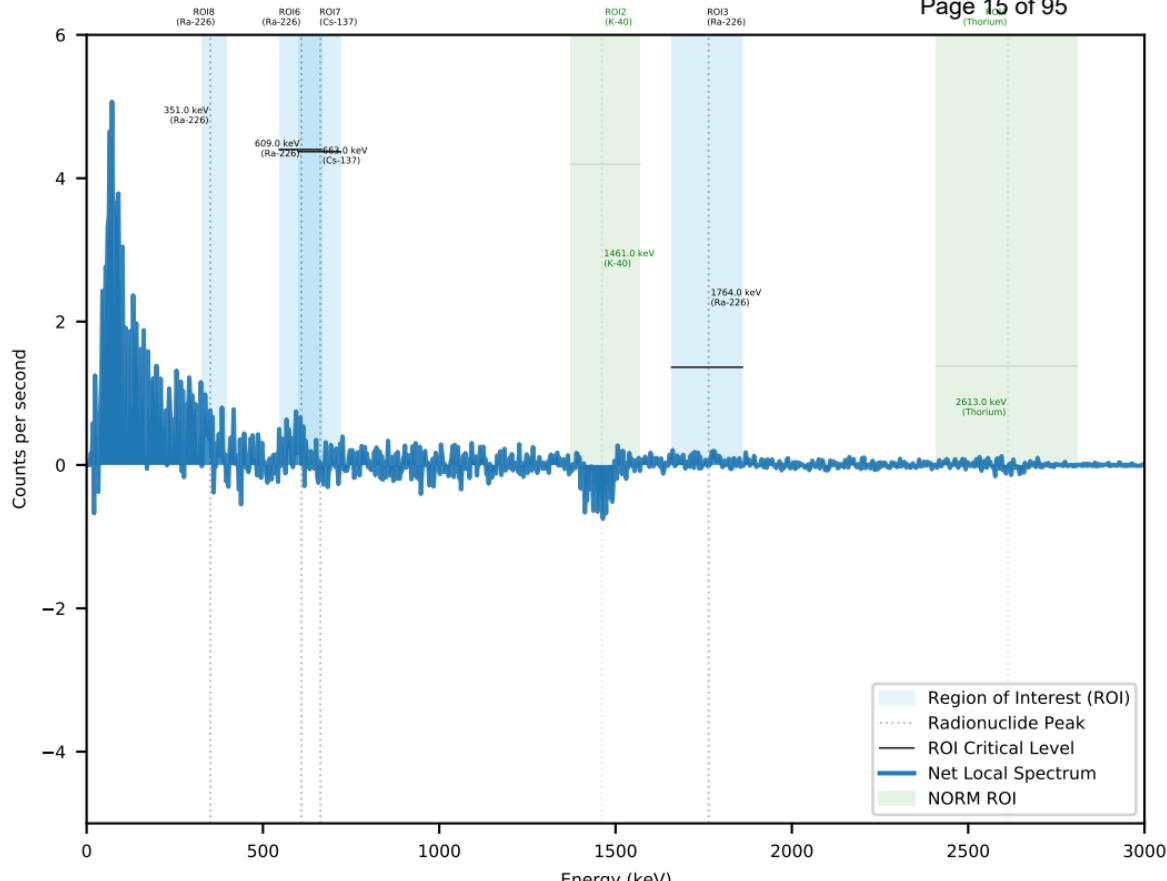
Net Gamma Spectrum, Static Location: 1

Page 14 of 95



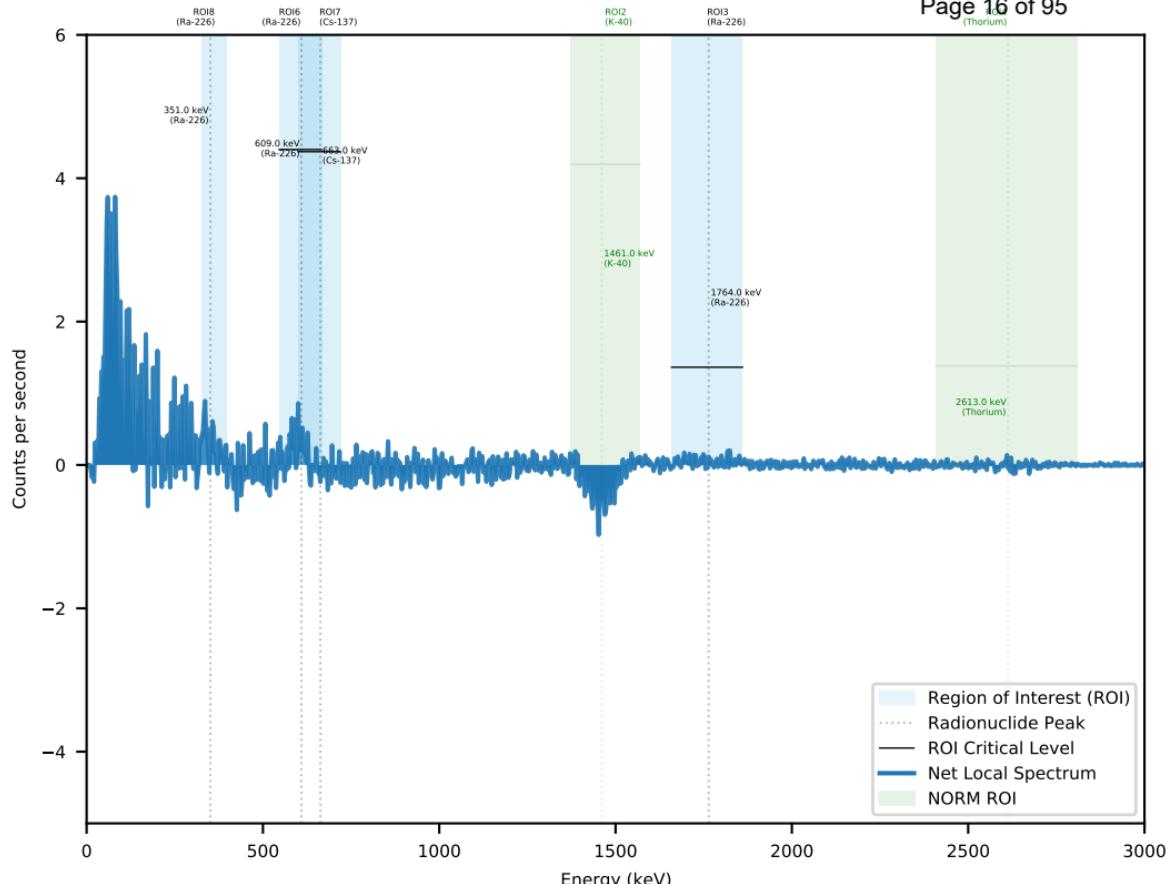
Net Gamma Spectrum, Static Location: 2

Page 15 of 95
 (Thorium)



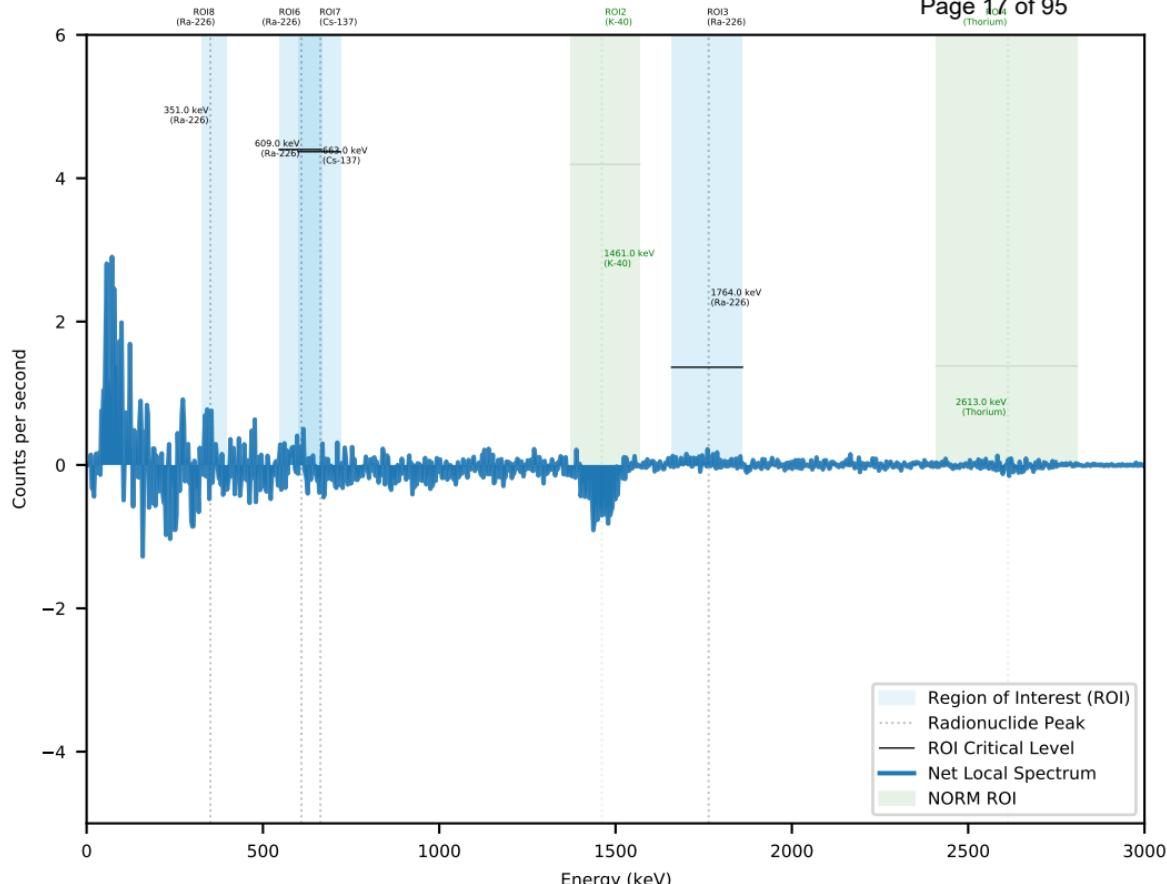
Net Gamma Spectrum, Static Location: 3

Page 16 of 95
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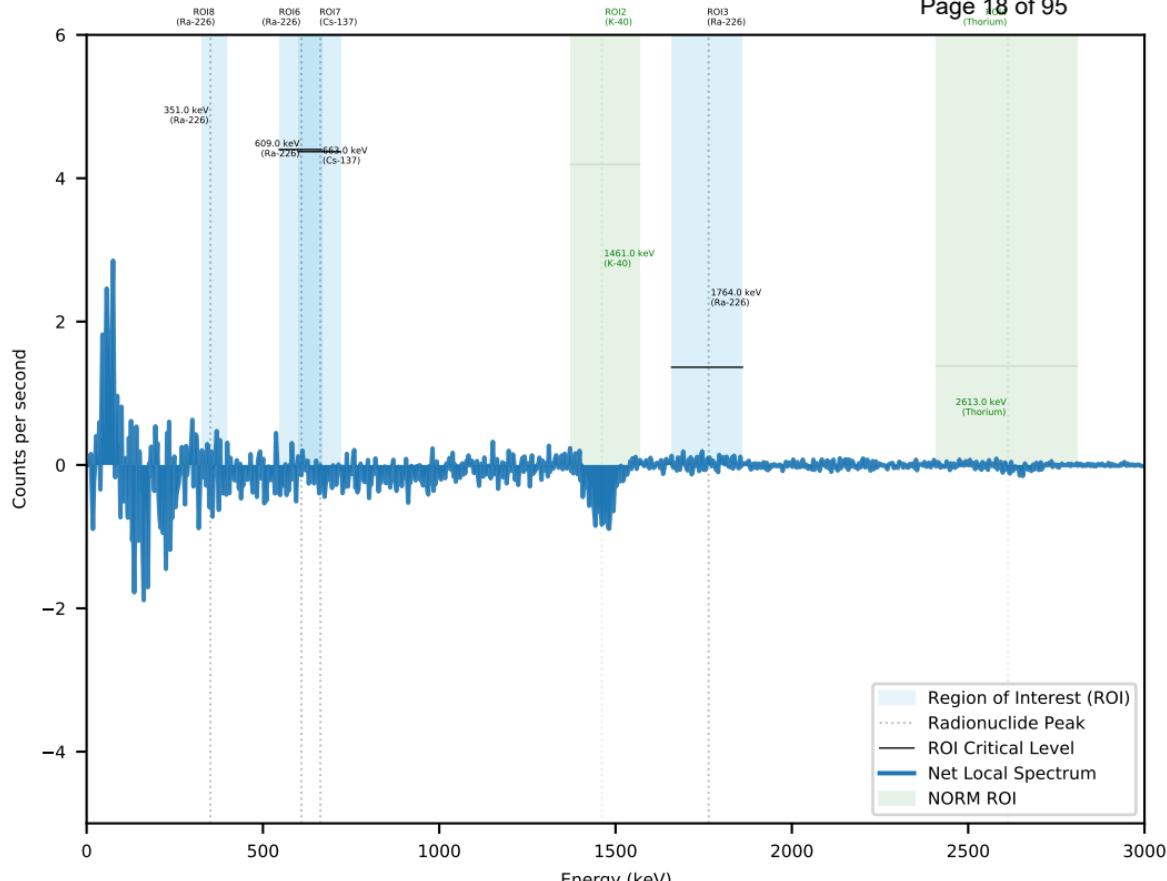
Net Gamma Spectrum, Static Location: 4

Page 17 of 95
 (Thorium)



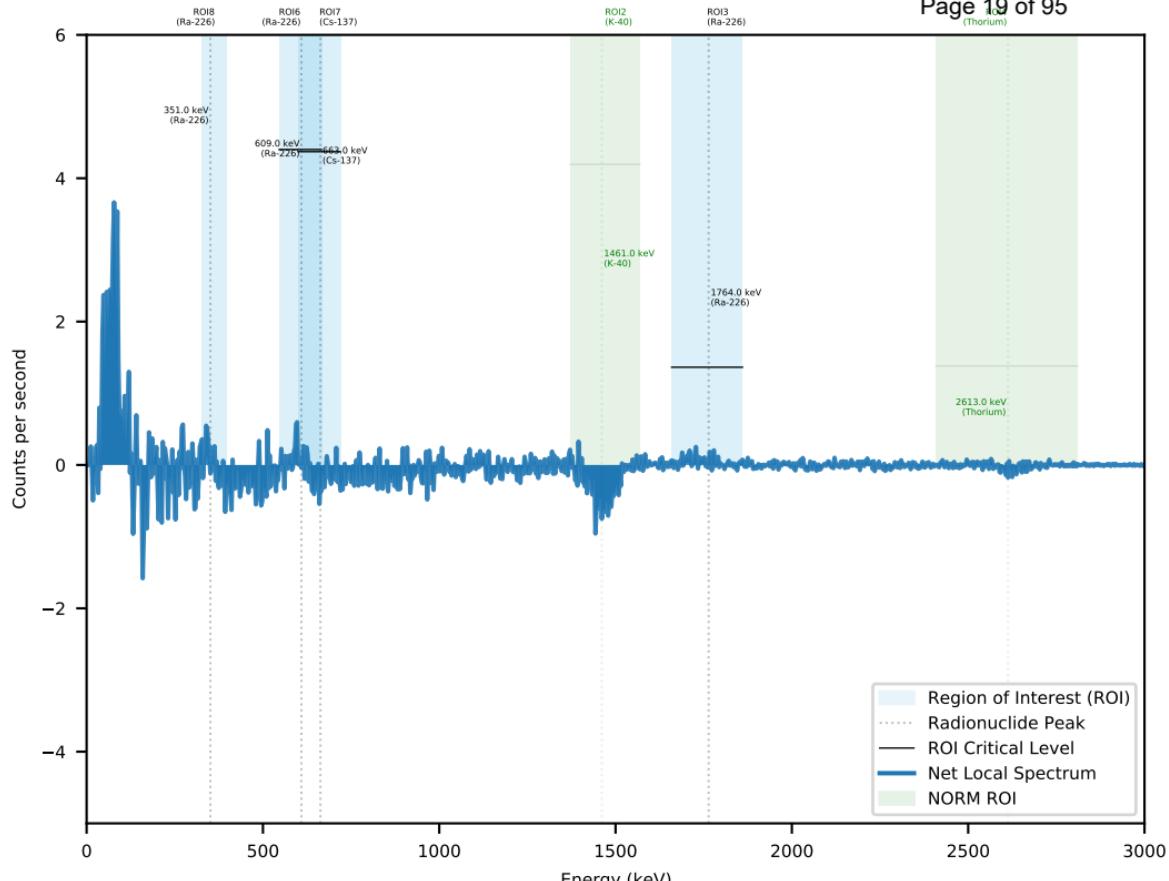
Net Gamma Spectrum, Static Location: 5

Page 18 of 95
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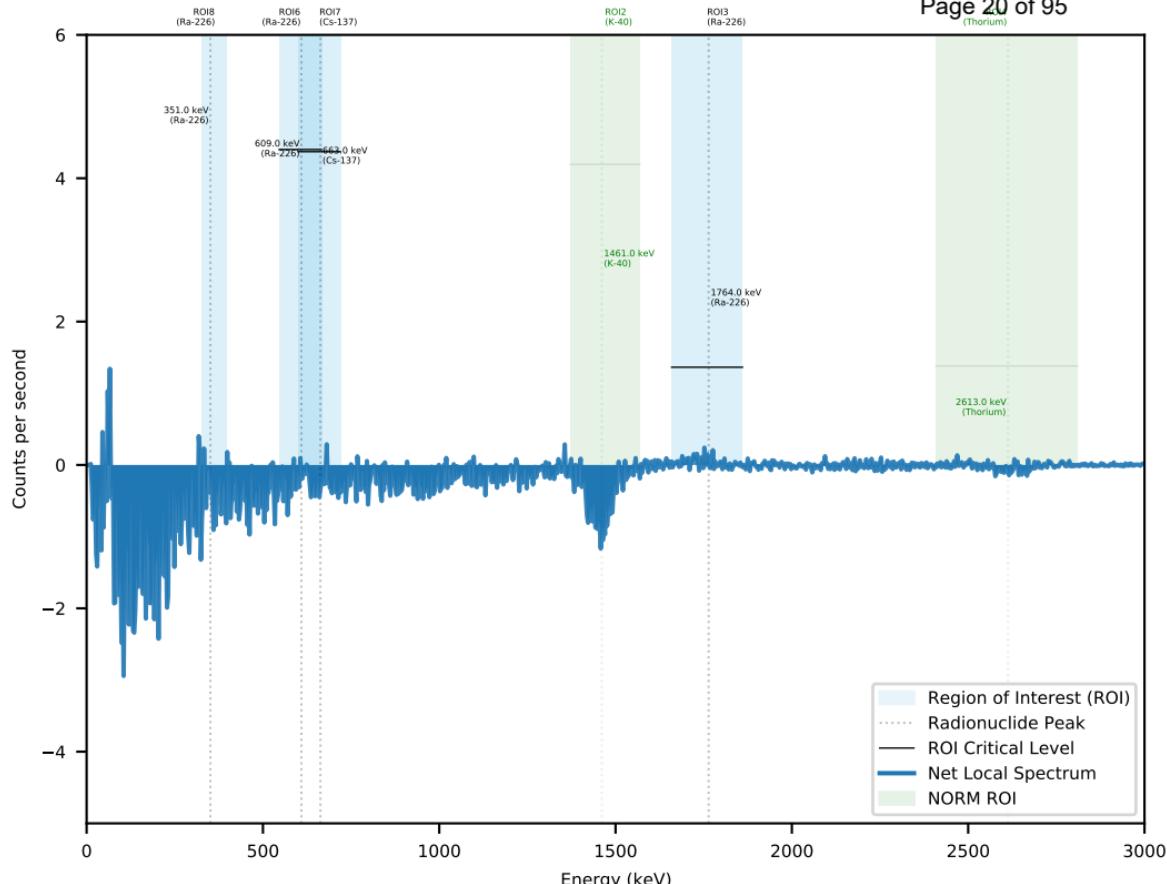
Net Gamma Spectrum, Static Location: 6

Page 19 of 95
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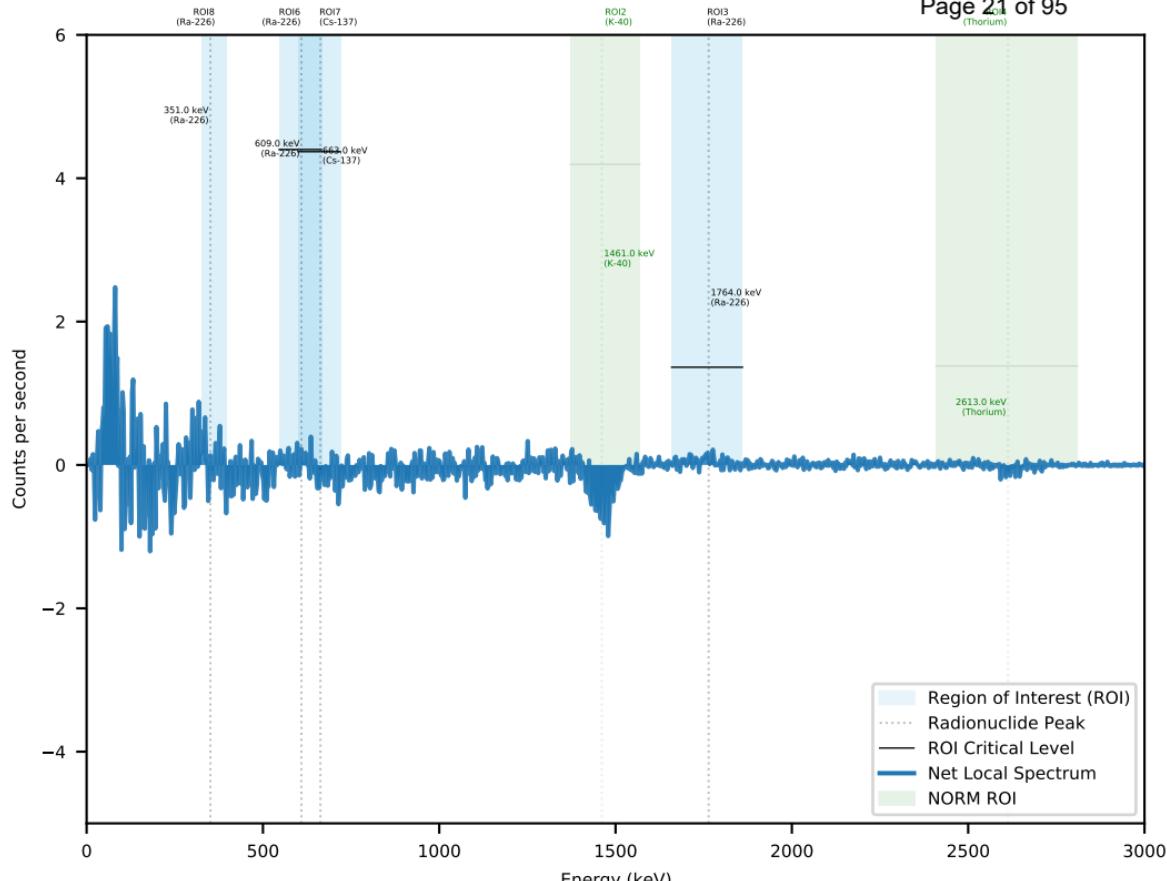
Net Gamma Spectrum, Static Location: 7

Page 20 of 95



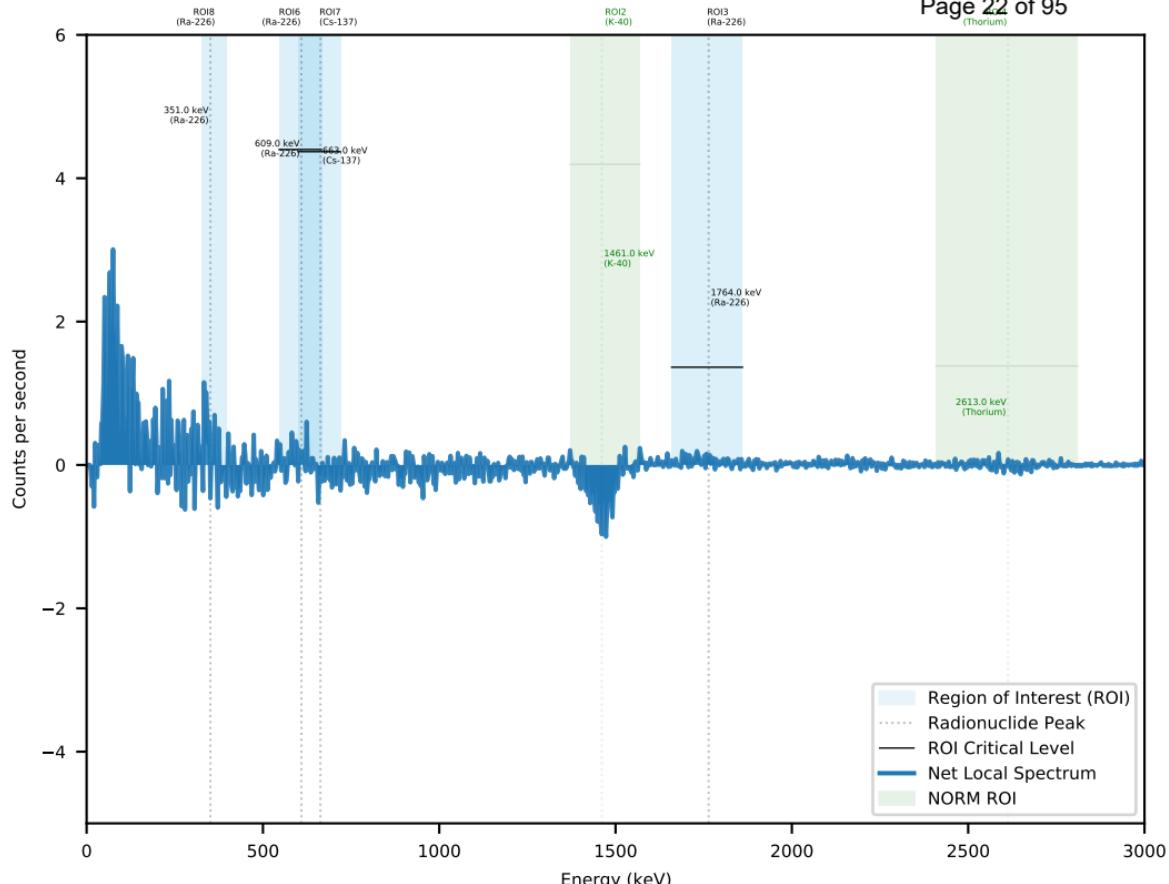
Net Gamma Spectrum, Static Location: 8

Page 21 of 95
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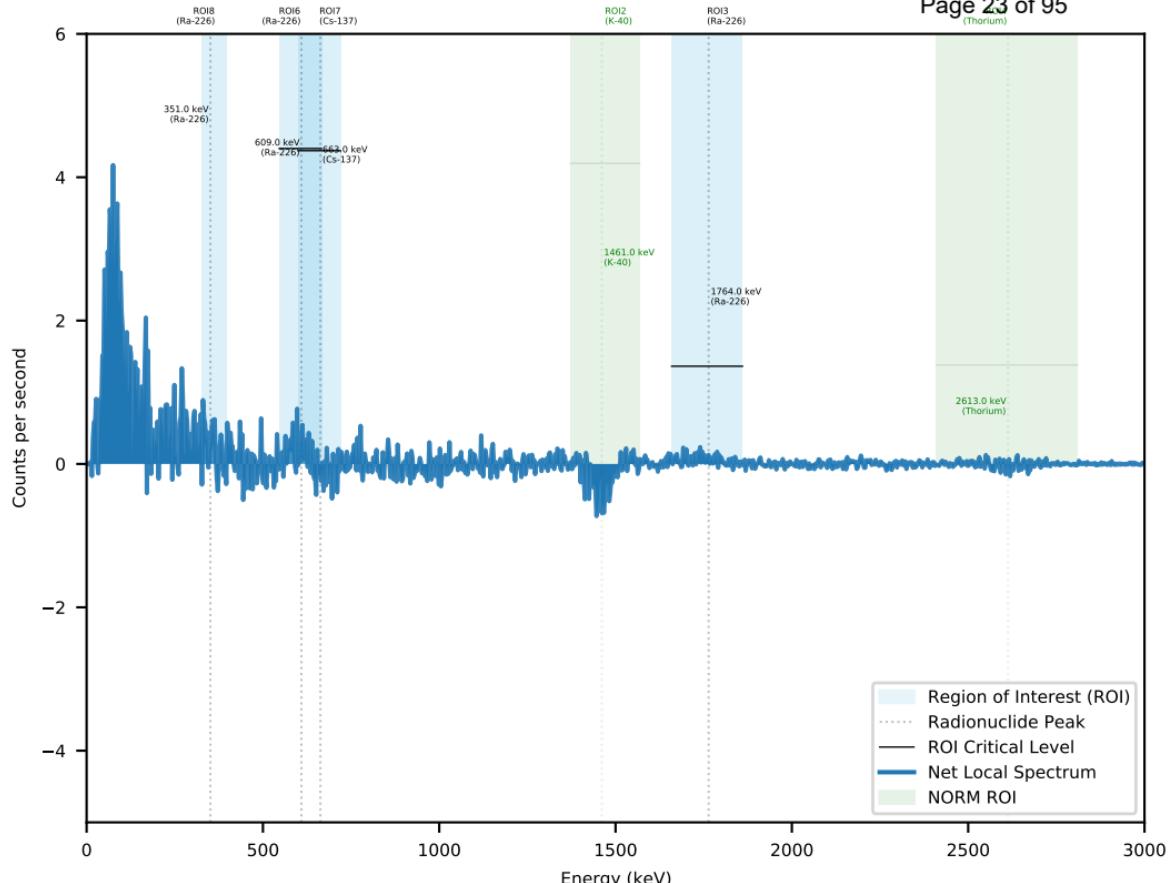
Net Gamma Spectrum, Static Location: 9

Page 22 of 95
 (Thorium)



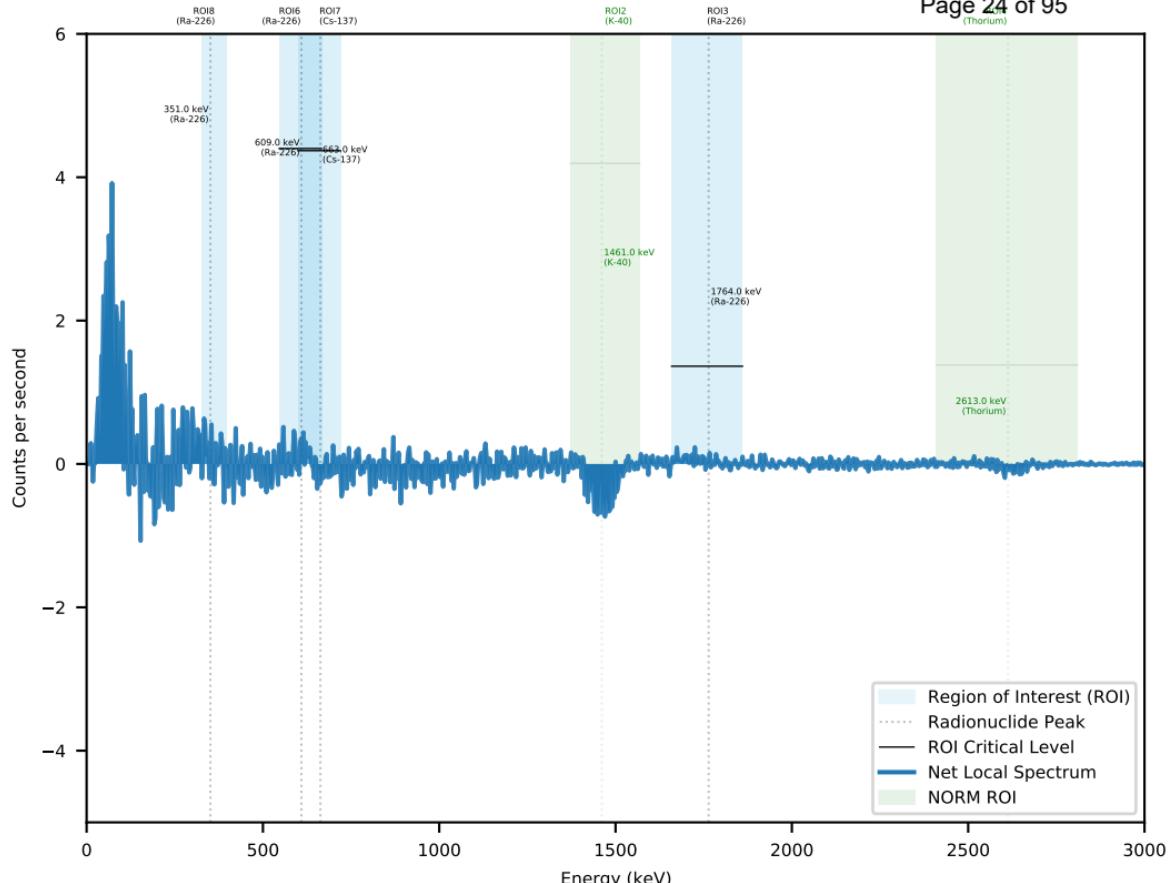
Net Gamma Spectrum, Static Location: 10

Page 23 of 95
 (Thorium)



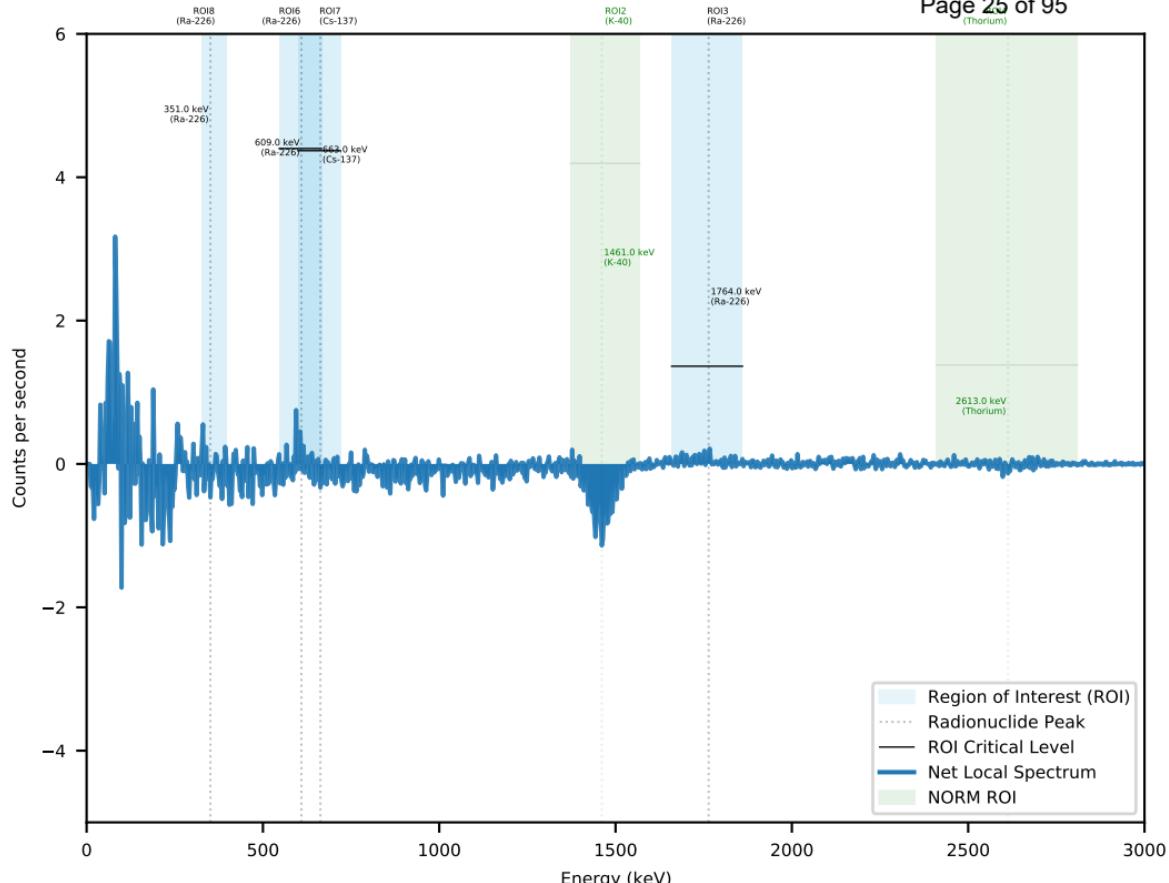
Net Gamma Spectrum, Static Location: 11

Page 24 of 95



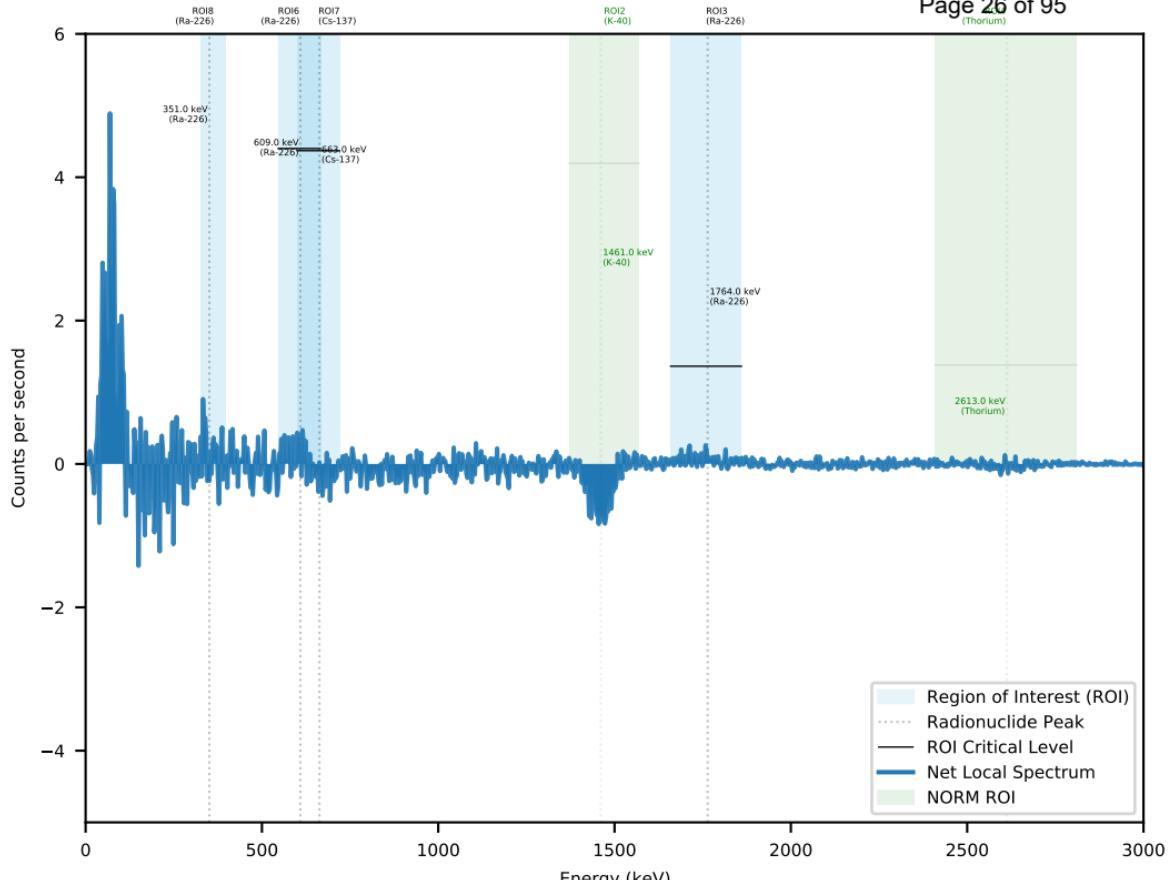
Net Gamma Spectrum, Static Location: 12

Page 25 of 95
 (Thorium)



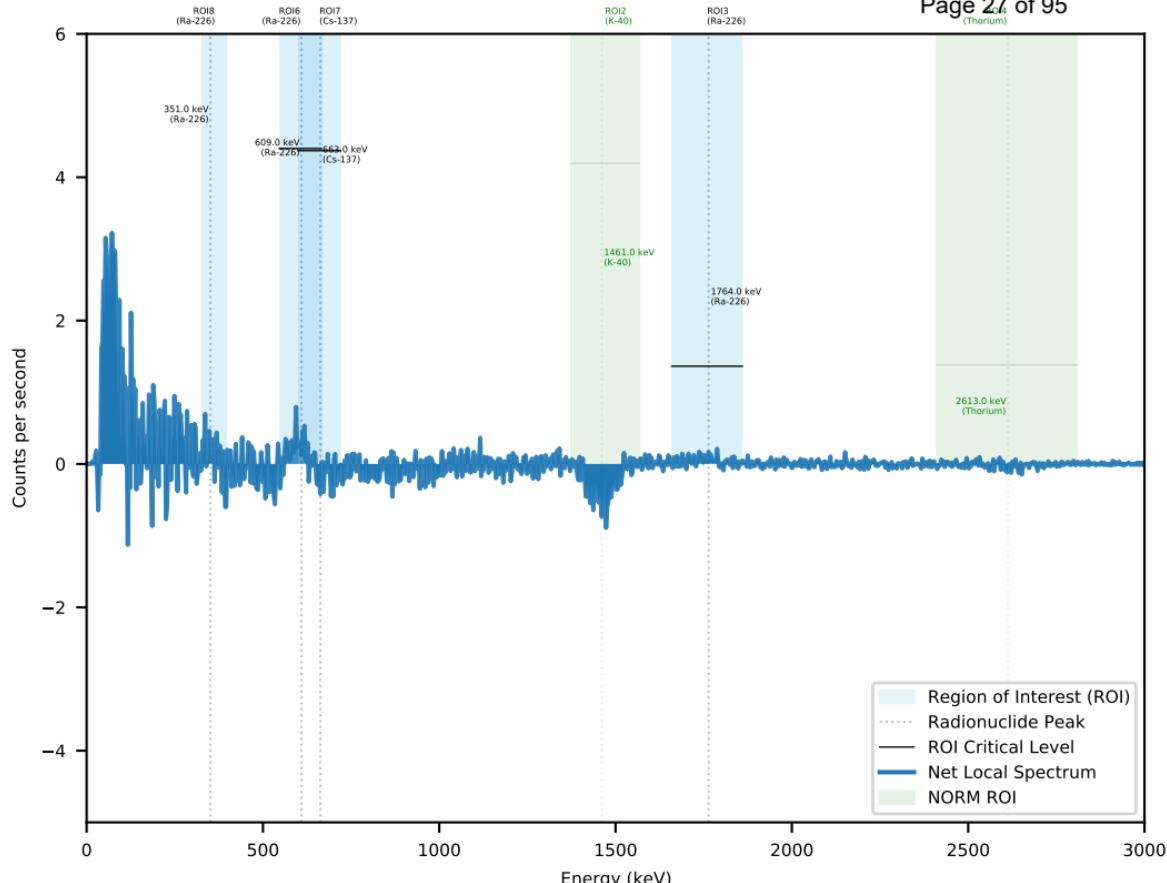
Net Gamma Spectrum, Static Location: 13

Page 26 of 95
 (Thorium)



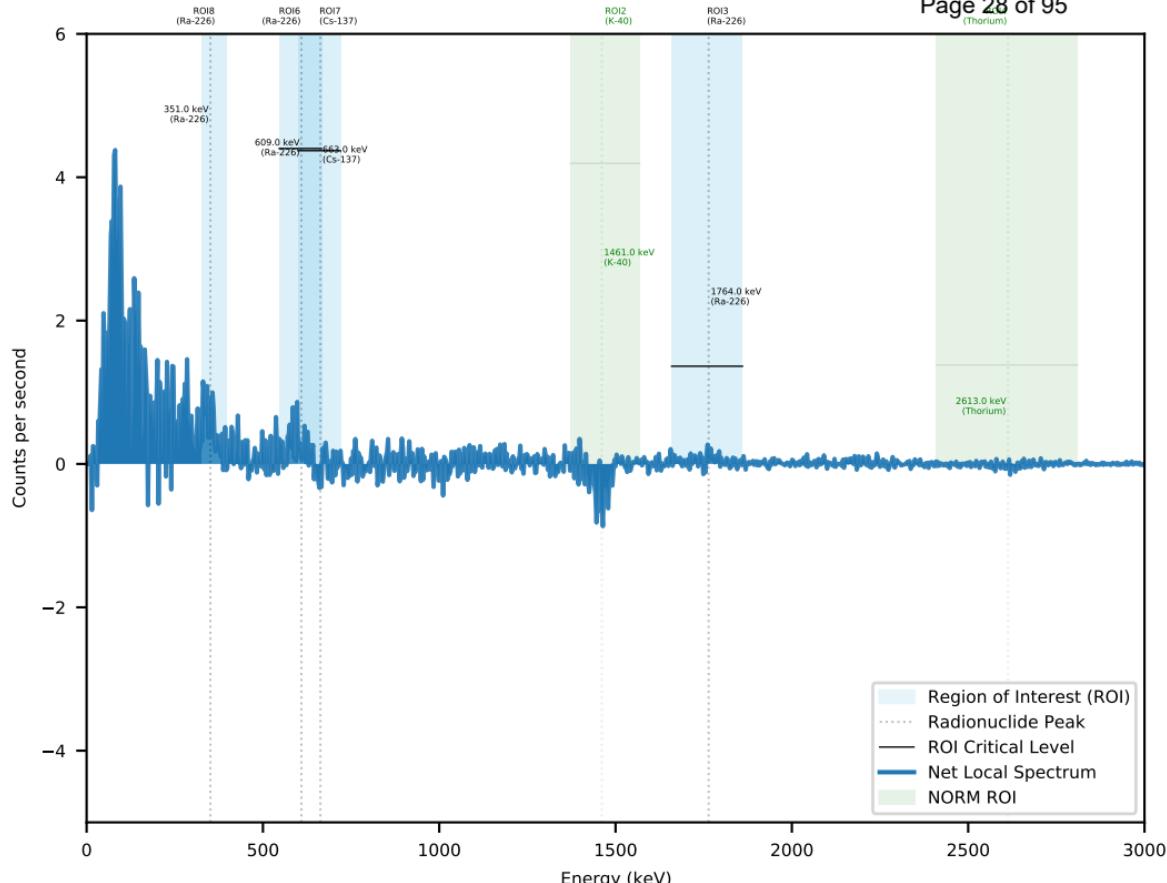
Net Gamma Spectrum, Static Location: 14

Page 27 of 95
 (Thorium)



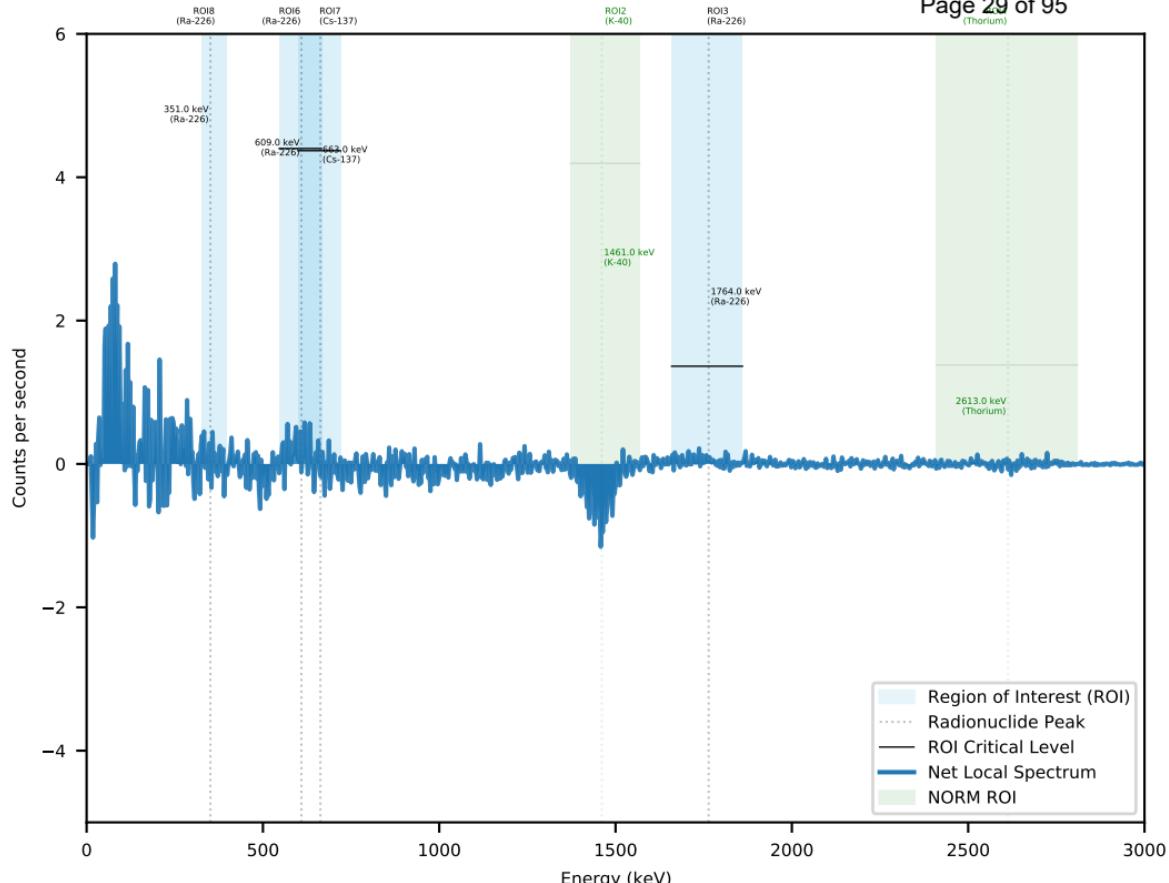
Net Gamma Spectrum, Static Location: 15

Page 28 of 95
 (Thorium)



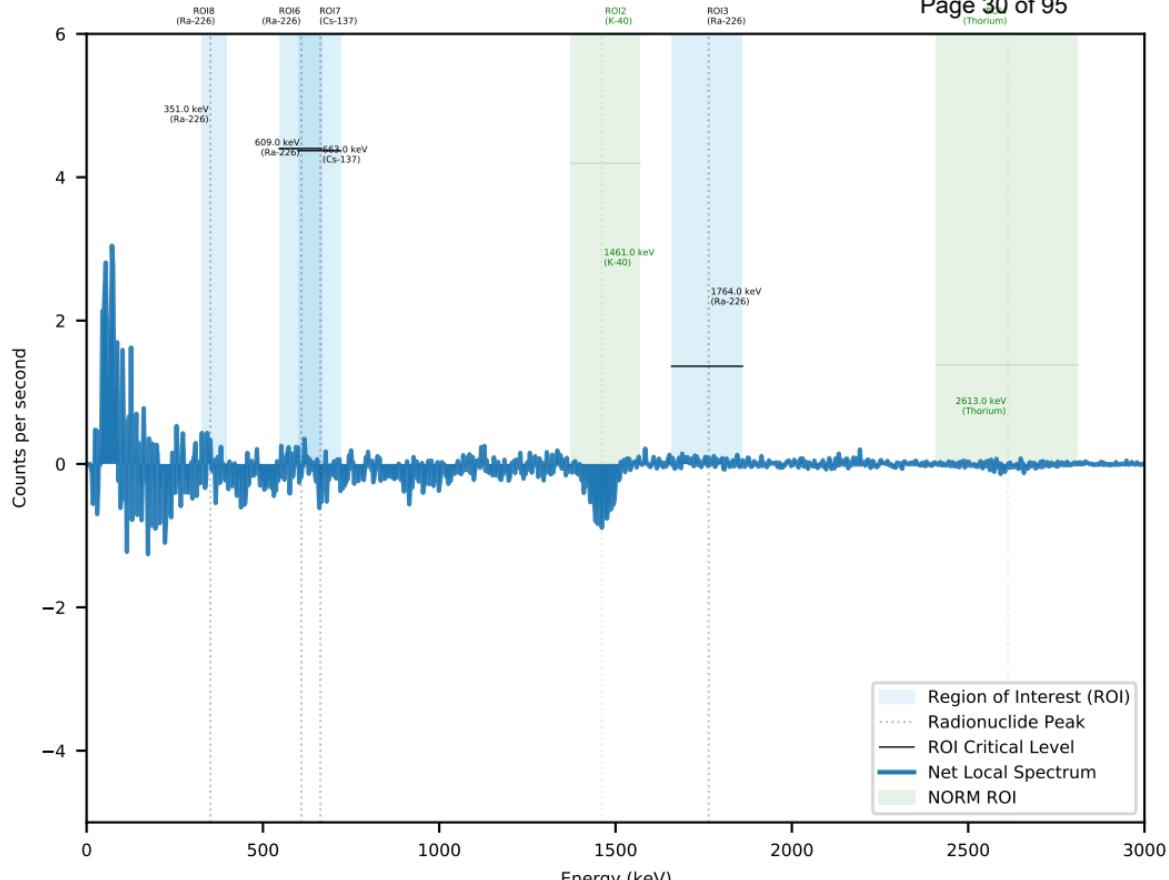
Net Gamma Spectrum, Static Location: 16

Page 29 of 95
 (Thorium)



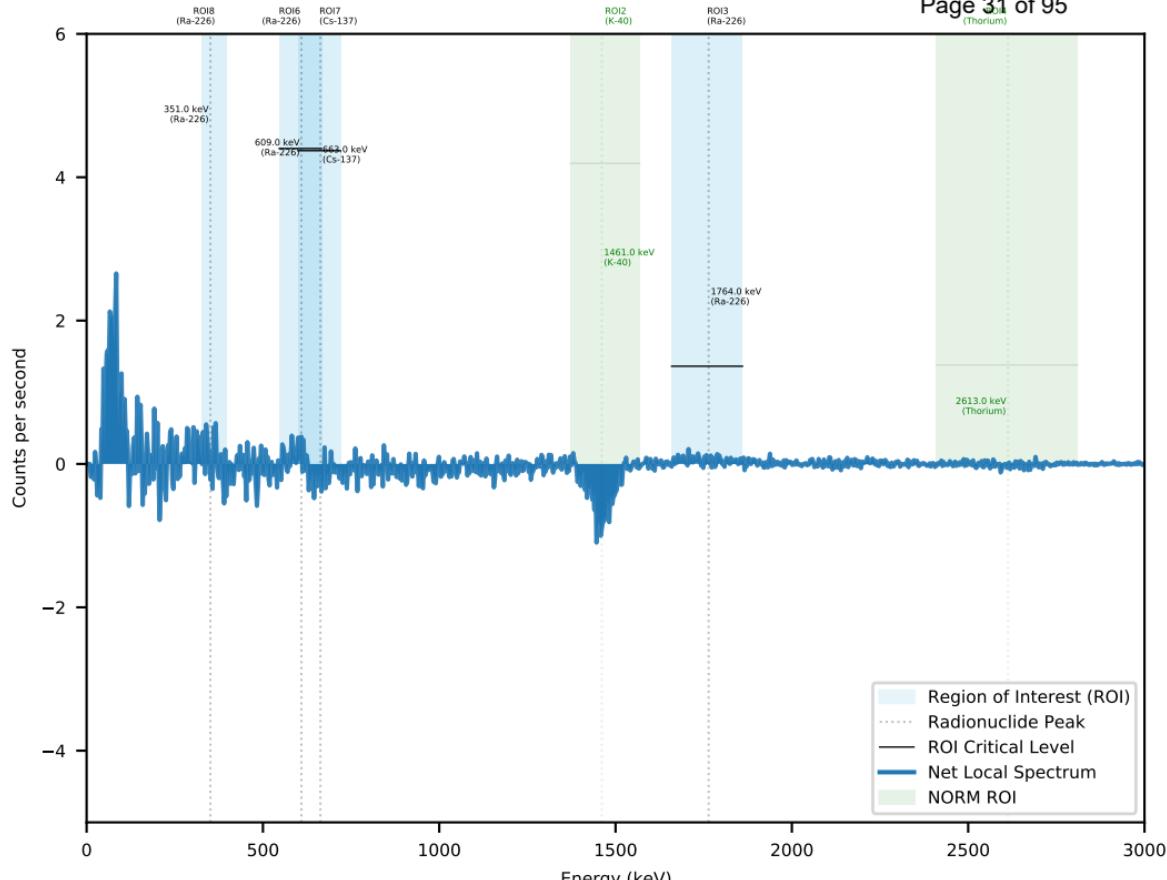
Net Gamma Spectrum, Static Location: 17

Page 30 of 95
 (Thorium)



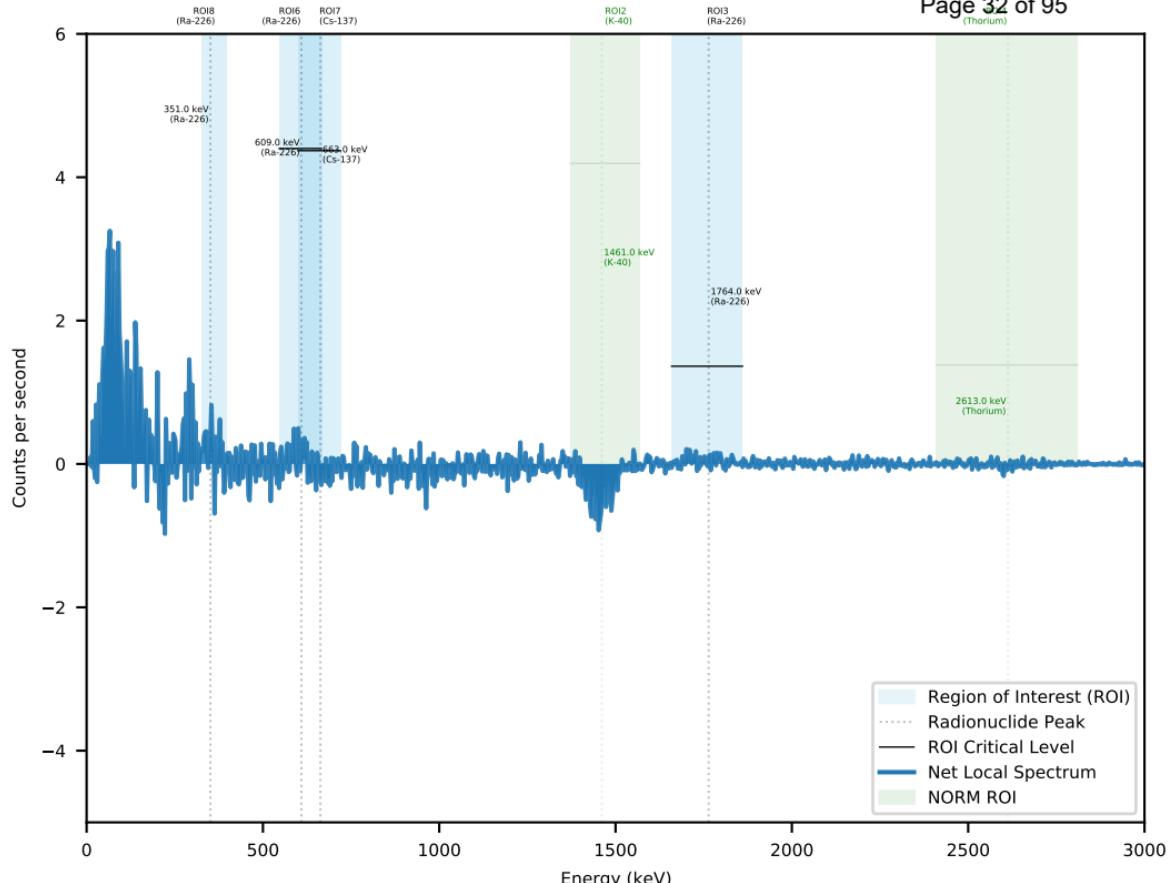
Net Gamma Spectrum, Static Location: 18

Page 31 of 95
 (Thorium)



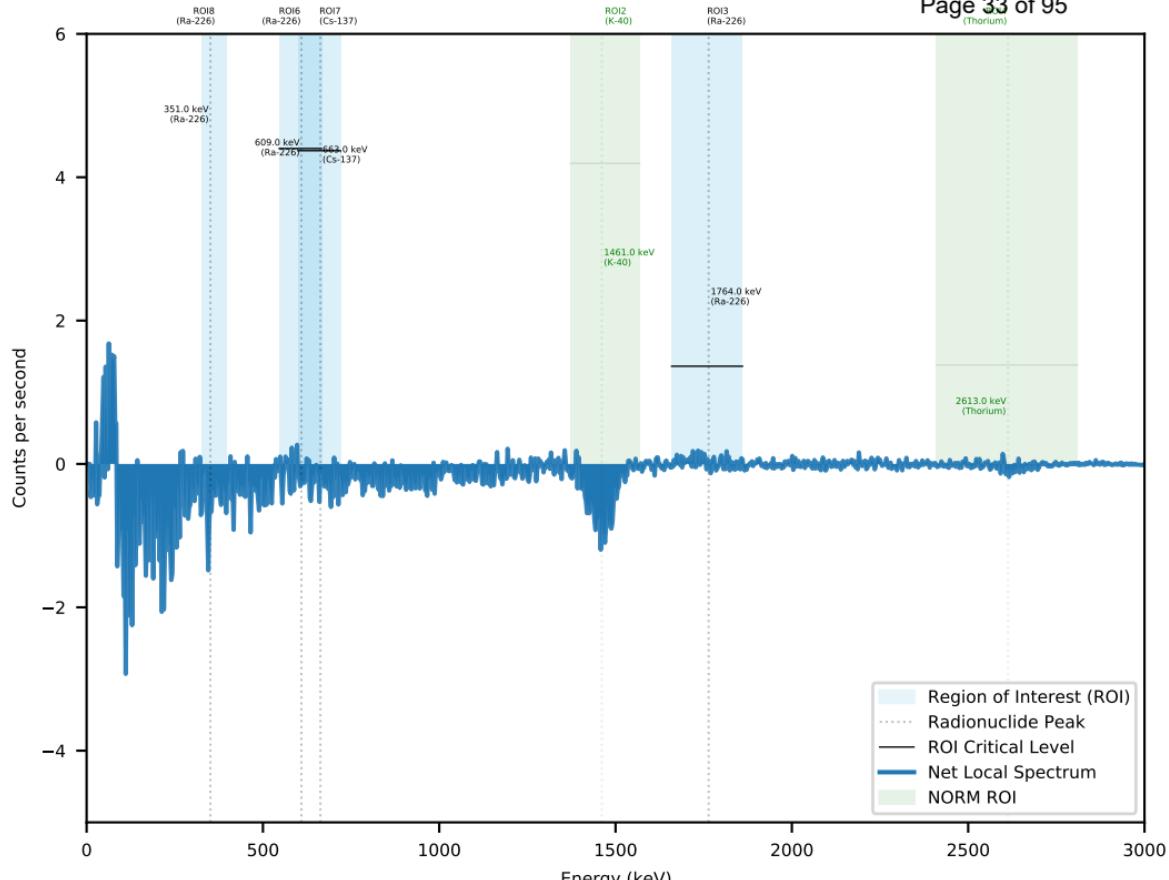
Net Gamma Spectrum, Static Location: 19

Page 32 of 95
 (Thorium)



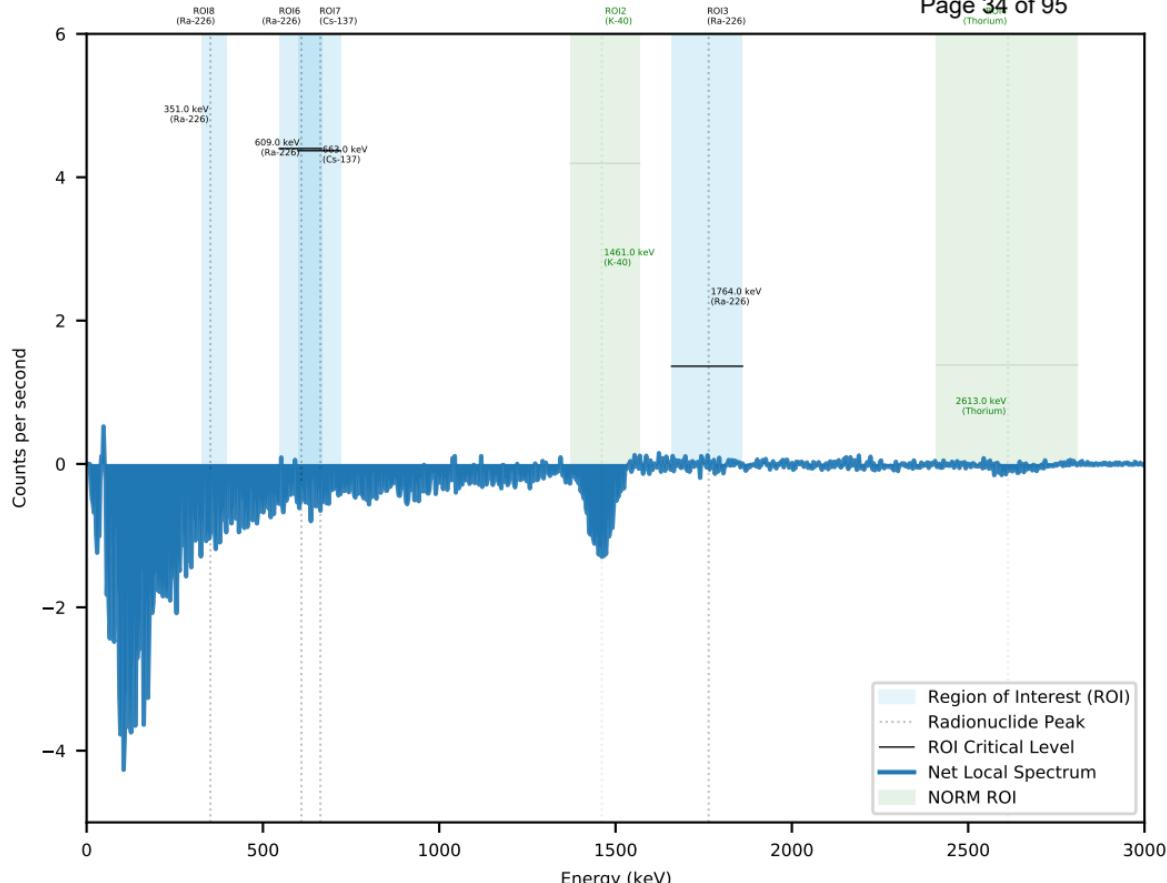
Net Gamma Spectrum, Static Location: 20

Page 33 of 95
 (Thorium)



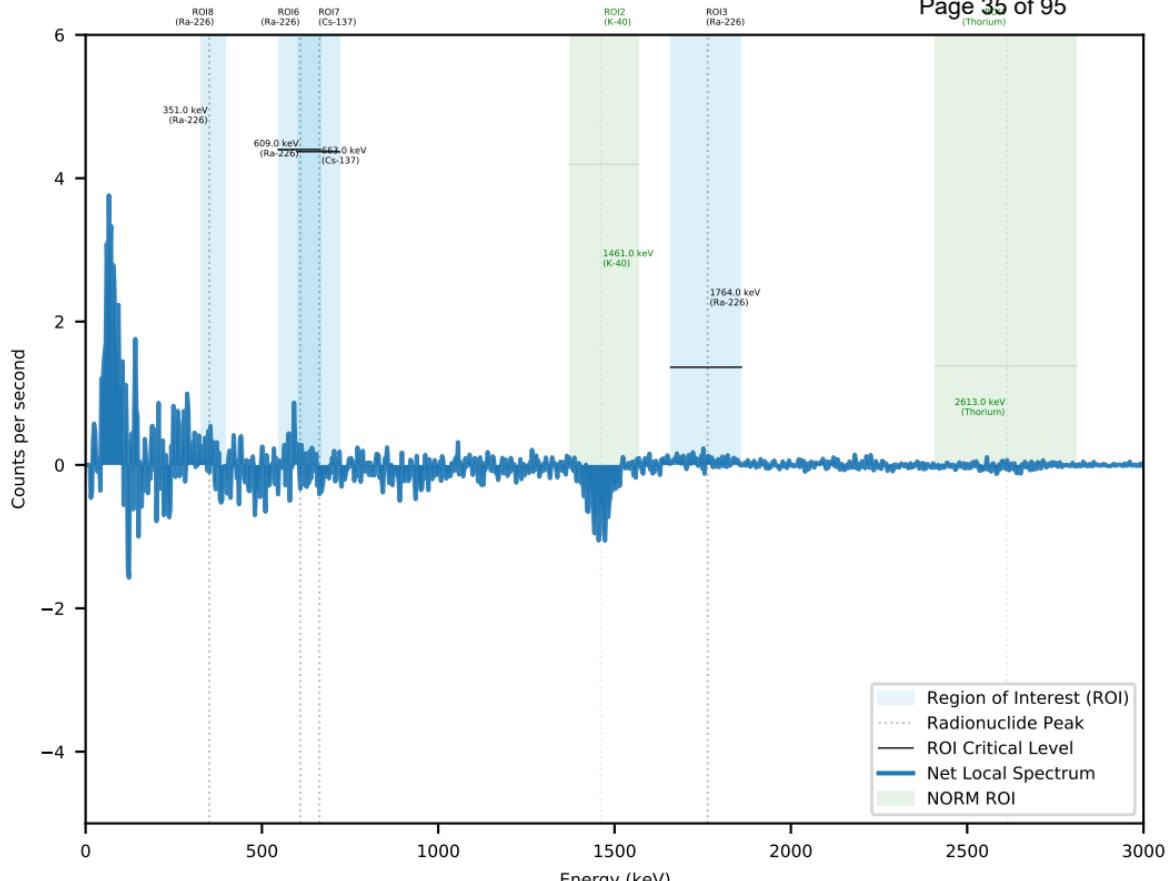
Net Gamma Spectrum, Static Location: 21

Page 34 of 95



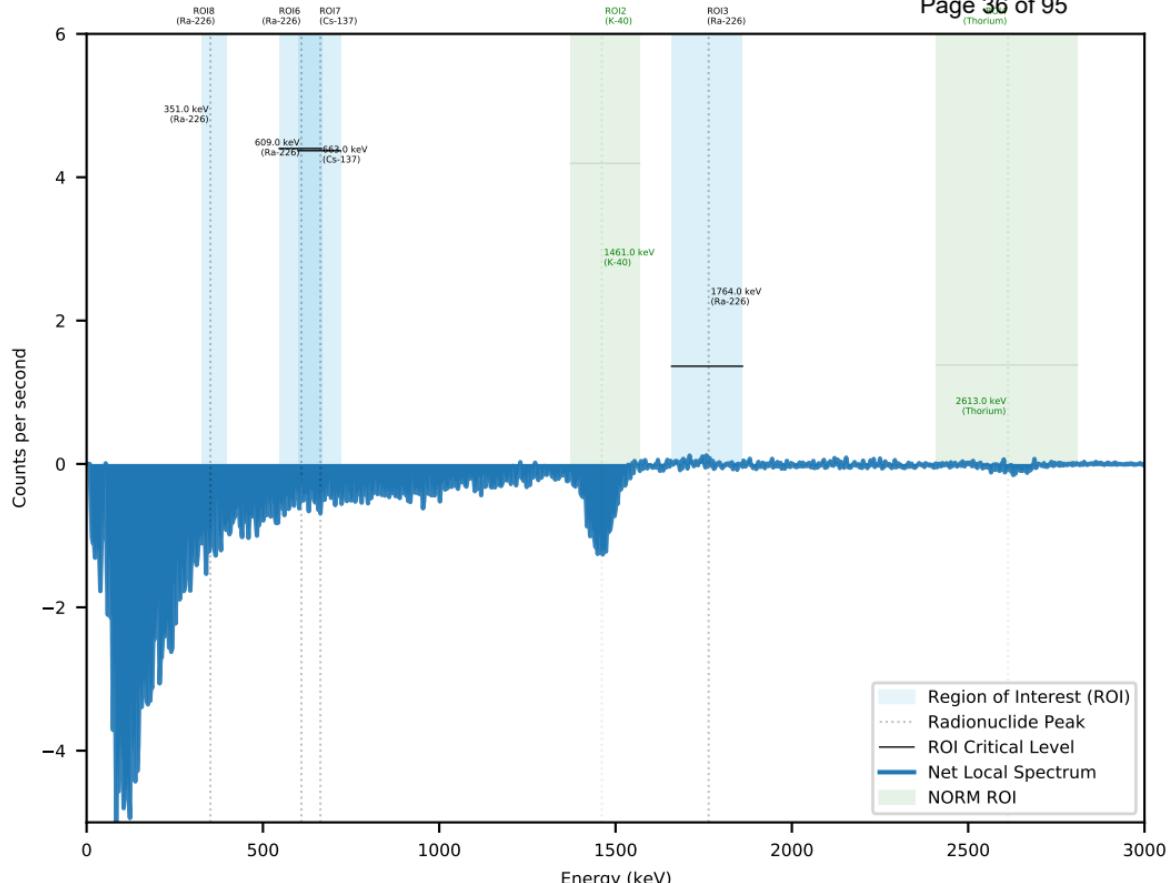
Net Gamma Spectrum, Static Location: 22

Page 35 of 95
 (Thorium)



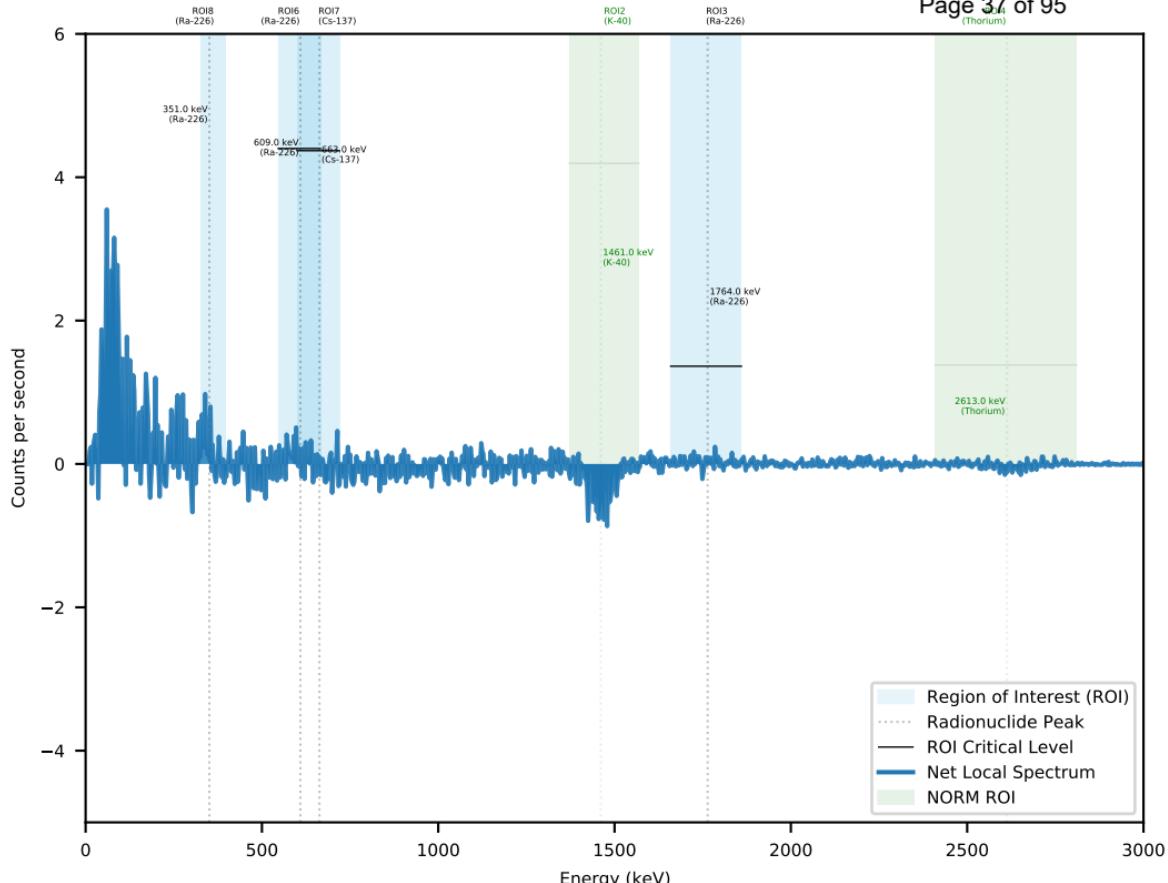
Net Gamma Spectrum, Static Location: 23

Page 36 of 95
 (Thorium)



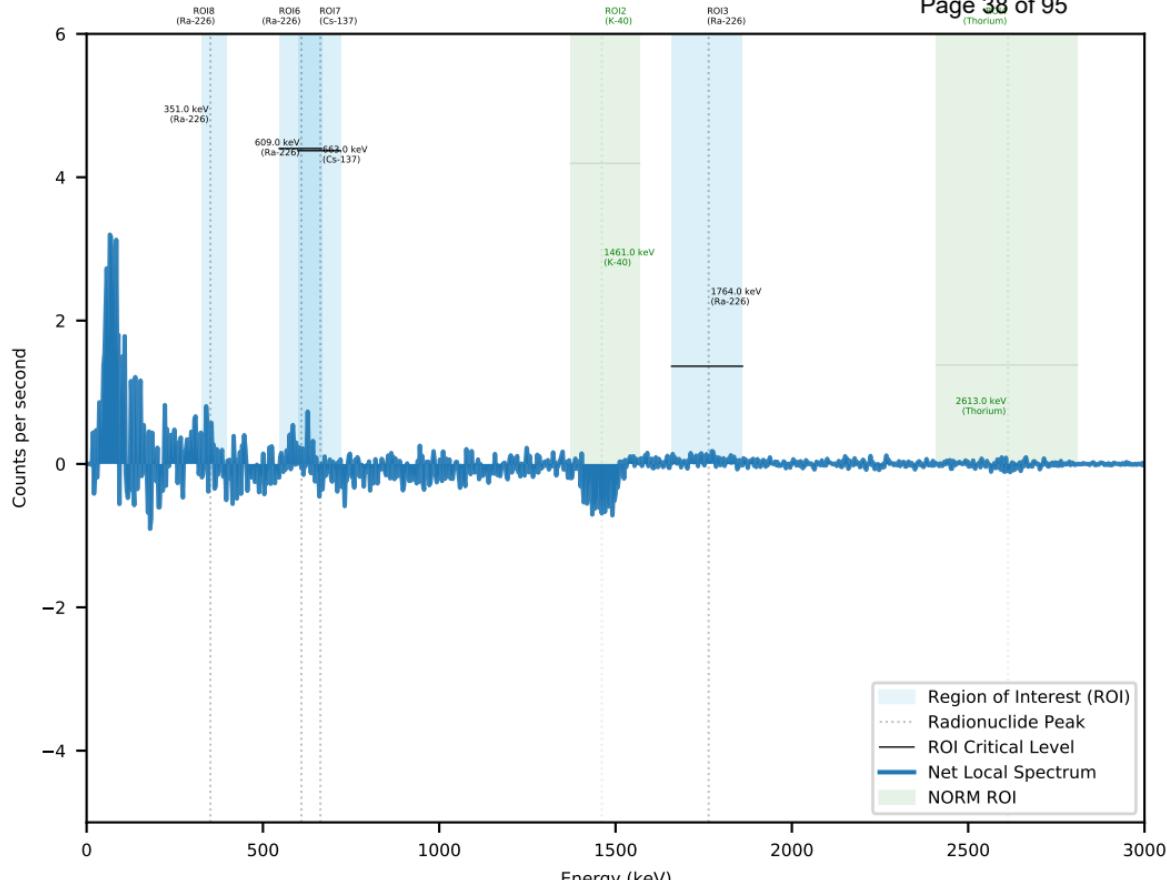
Net Gamma Spectrum, Static Location: 24

Page 37 of 95
 (Thorium)



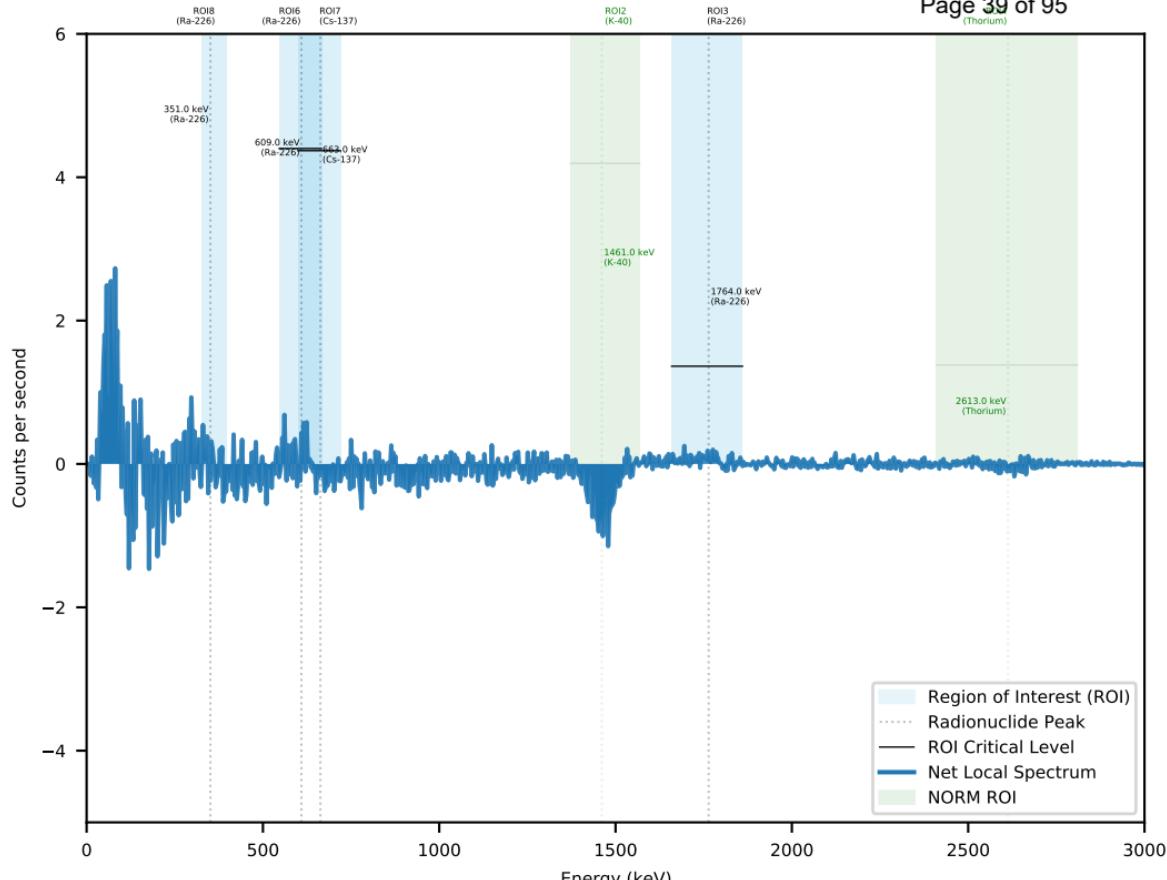
Net Gamma Spectrum, Static Location: 25

Page 38 of 95
 (Thorium)



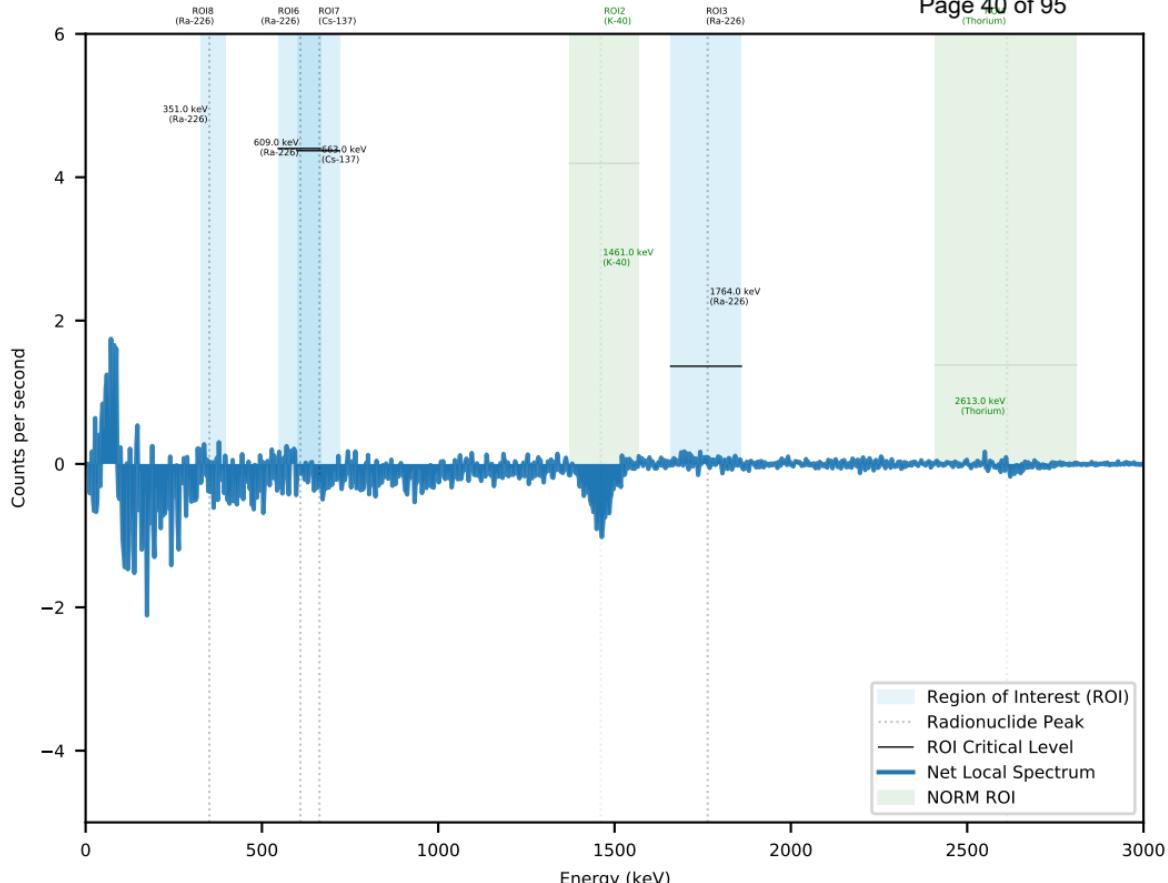
Net Gamma Spectrum, Static Location: 26

Page 39 of 95
 (Thorium)



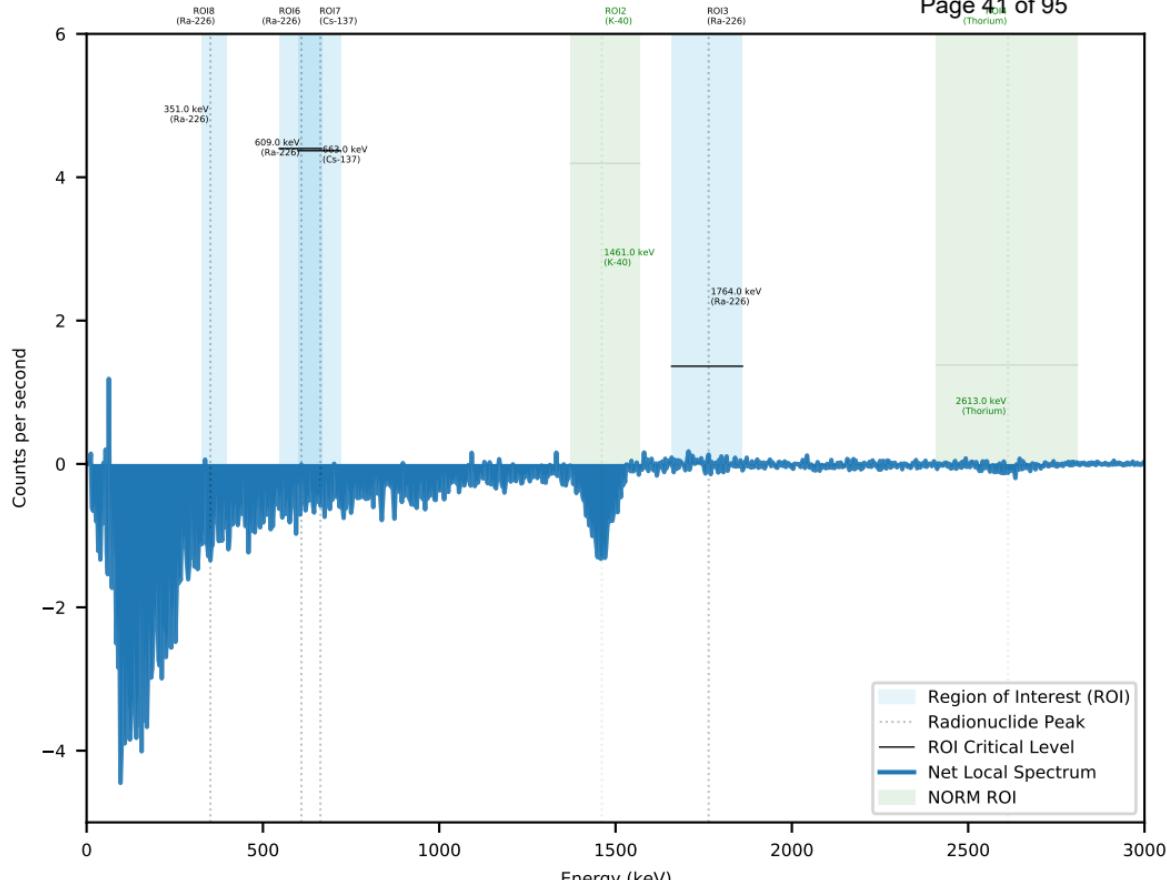
Net Gamma Spectrum, Static Location: 27

Page 40 of 95
 (Thorium)



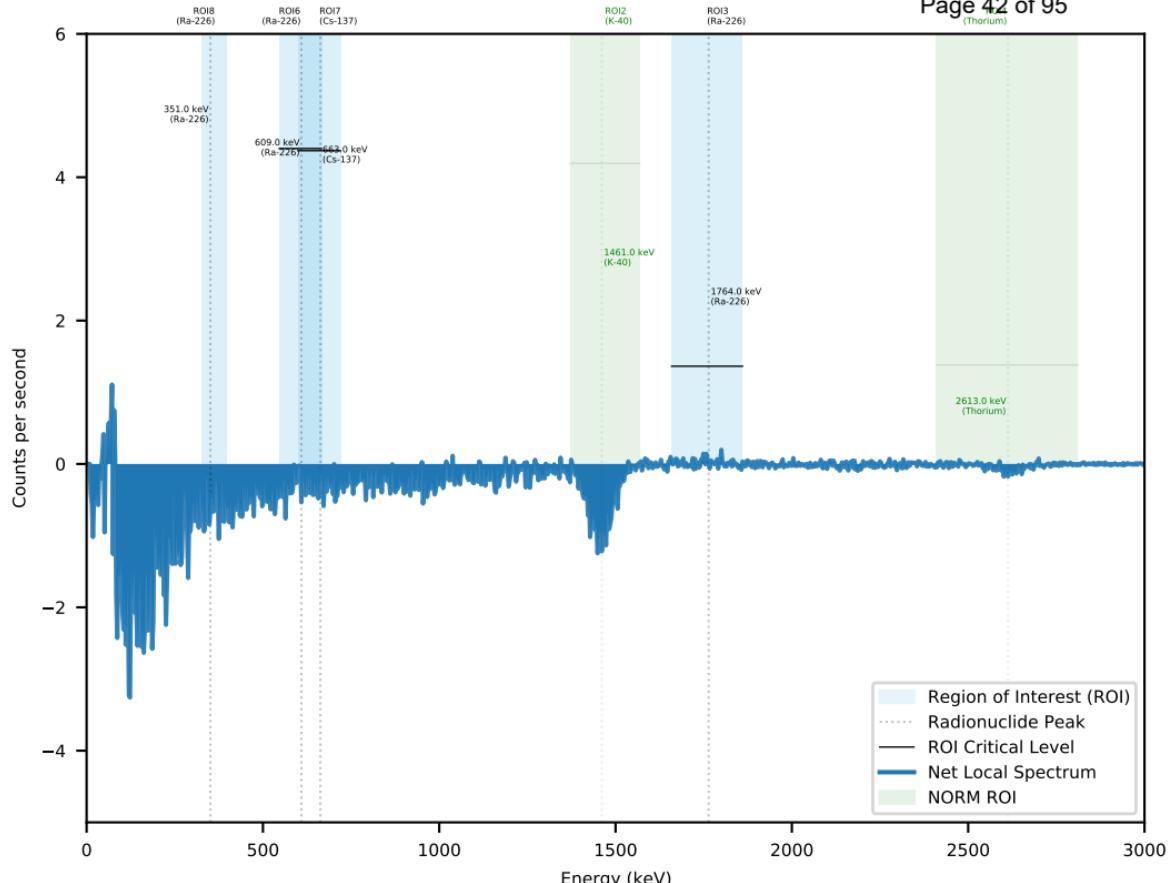
Net Gamma Spectrum, Static Location: 28

Page 41 of 95
 (Thorium)



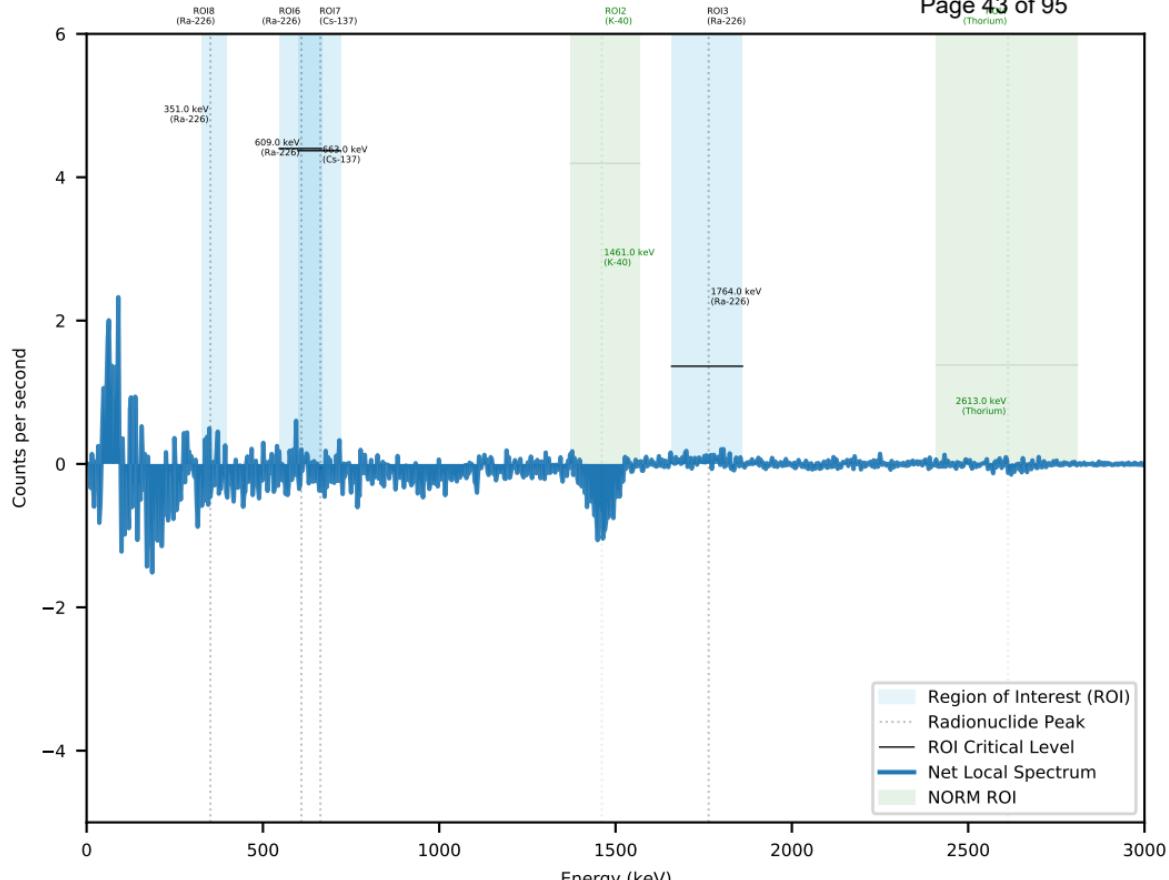
Net Gamma Spectrum, Static Location: 29

Page 42 of 95
 (Thorium)



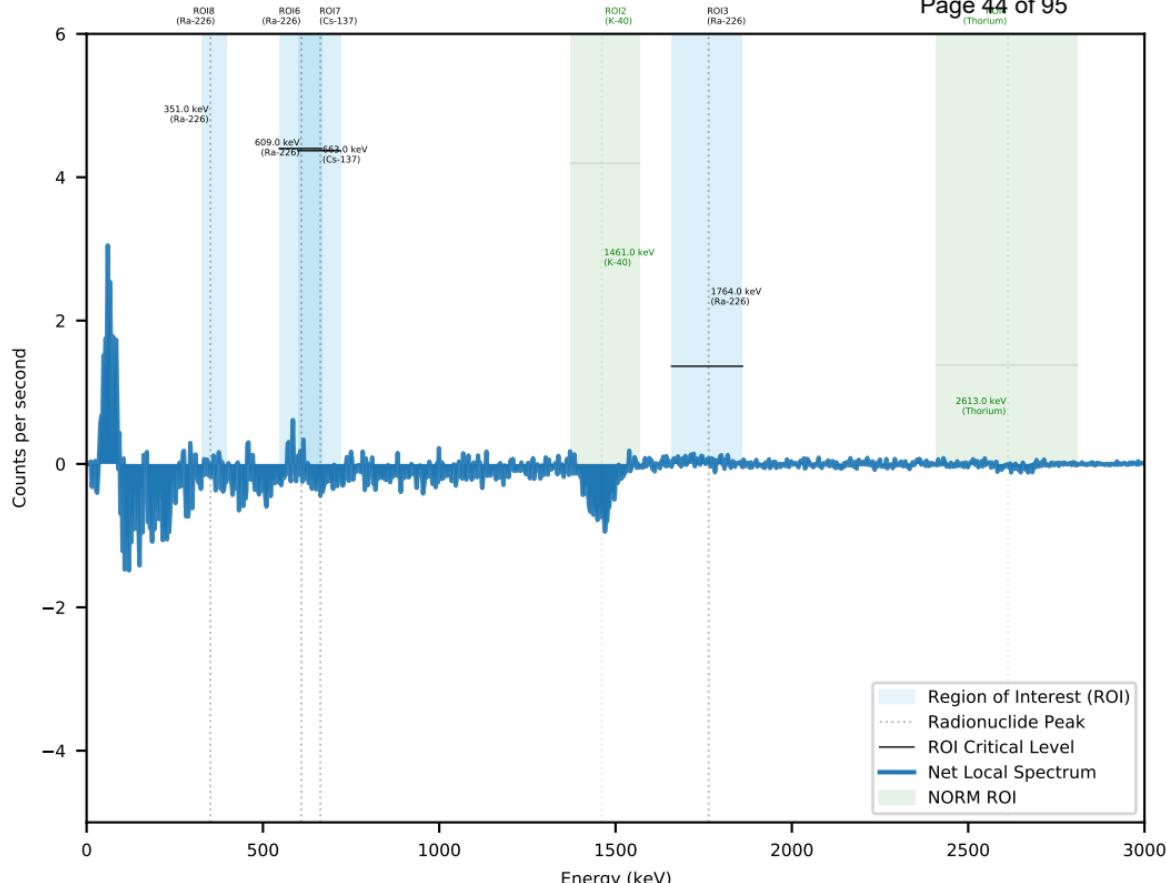
Net Gamma Spectrum, Static Location: 30

Page 43 of 95
 (Thorium)



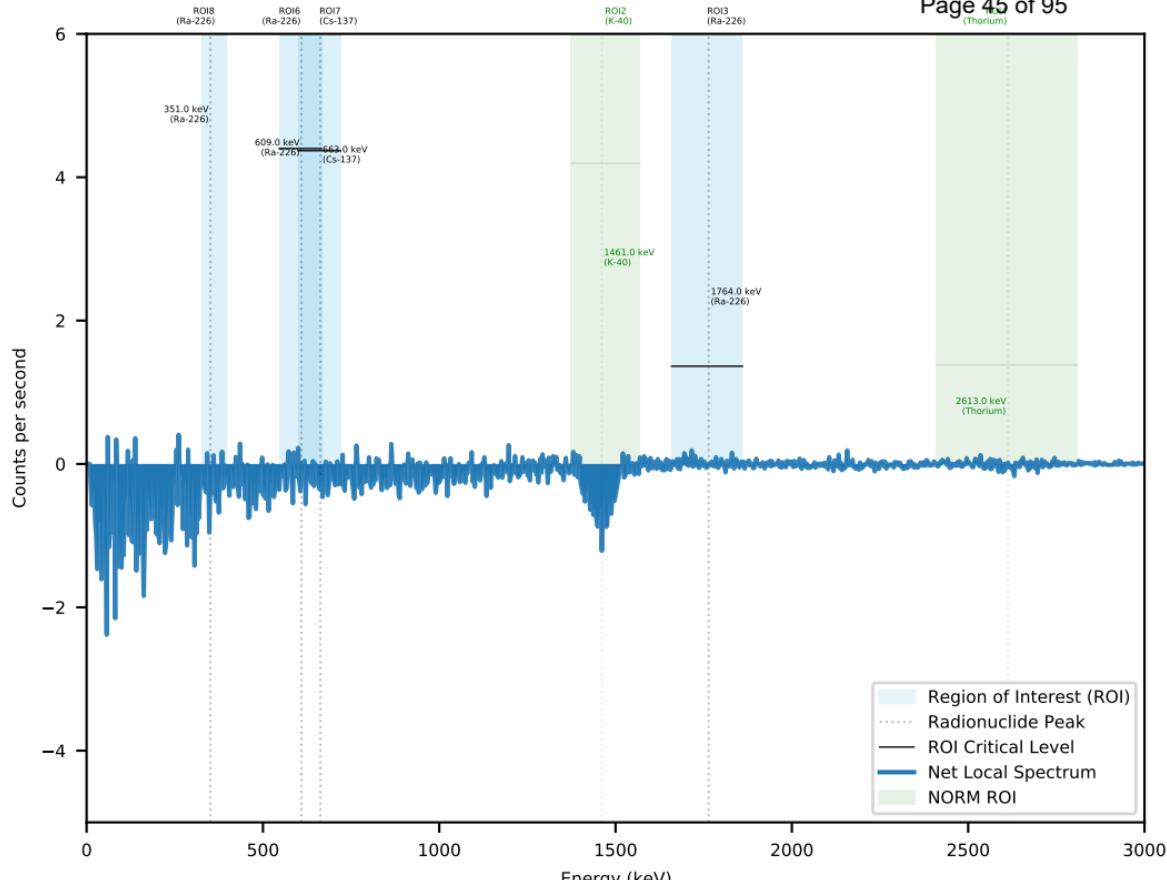
Net Gamma Spectrum, Static Location: 31

Page 44 of 95



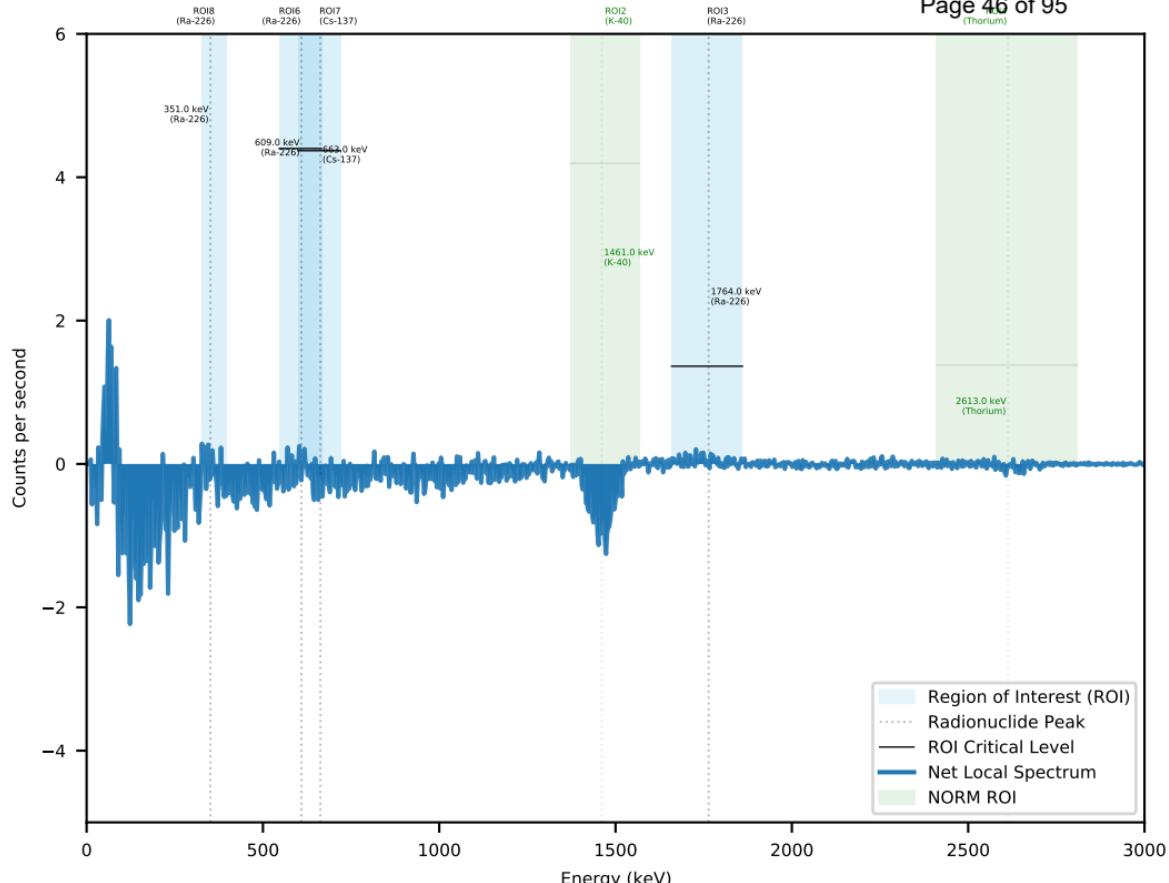
Net Gamma Spectrum, Static Location: 32

Page 45 of 95
 (Thorium)



Net Gamma Spectrum, Static Location: 33

Page 46 of 95
 (Thorium)





Environment Testing America



ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40635-1
Laboratory Sample Delivery Group: GJ46599741
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
12/31/2020 8:23:37 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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Expert

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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2

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4

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6

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8

9

10

11

12

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	10
Definitions/Glossary	11
Method Summary	12
Sample Summary	13
Client Sample Results	14
QC Sample Results	29
QC Association Summary	32
Tracer Carrier Summary	34

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 49 of 95

Job ID: 160-40635-1
SDG: GJ46599741

Job ID: 160-40635-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40635-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 12/3/2020 9:55 AM; the samples arrived in good condition, and where required, properly preserved. The

Case Narrative

Page 50 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Job ID: 160-40635-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

temperature of the cooler at receipt was 9.4° C.

STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU077B-001 (160-40635-1), HPPG-ESU-TU077B-011 (160-40635-11) and HPPG-ESU-TU077B-021 (160-40635-21) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 12/04/2020, prepared on 12/09/2020 and analyzed on 12/18/2020.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix. The samples contained rocks of varying sizes: HPPG-ESU-TU077B-001 (160-40635-1), HPPG-ESU-TU077B-011 (160-40635-11), and HPPG-ESU-TU077B-021 (160-40635-21).

The method blank (MB) z-score is within limits and is stored in the level IV raw data: (MB 160-491323/23-A).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU077B-001 (160-40635-1), HPPG-ESU-TU077B-002 (160-40635-2), HPPG-ESU-TU077B-003 (160-40635-3), HPPG-ESU-TU077B-004 (160-40635-4), HPPG-ESU-TU077B-005 (160-40635-5), HPPG-ESU-TU077B-006 (160-40635-6), HPPG-ESU-TU077B-007 (160-40635-7), HPPG-ESU-TU077B-008 (160-40635-8), HPPG-ESU-TU077B-009 (160-40635-9), HPPG-ESU-TU077B-010 (160-40635-10), HPPG-ESU-TU077B-011 (160-40635-11), HPPG-ESU-TU077B-012 (160-40635-12), HPPG-ESU-TU077B-013 (160-40635-13), HPPG-ESU-TU077B-014 (160-40635-14), HPPG-ESU-TU077B-015 (160-40635-15), HPPG-ESU-TU077B-016 (160-40635-16), HPPG-ESU-TU077B-017 (160-40635-17), HPPG-ESU-TU077B-018 (160-40635-18), HPPG-ESU-TU077B-019 (160-40635-19), HPPG-ESU-TU077B-020 (160-40635-20), HPPG-ESU-TU077B-021 (160-40635-21), HPPG-ESU-TU077B-022 (160-40635-22), HPPG-ESU-TU077B-023 (160-40635-23), HPPG-ESU-TU077B-024 (160-40635-24), HPPG-ESU-TU077B-025 (160-40635-25), HPPG-F-051 (160-40635-26) and HPPG-F-052 (160-40635-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 12/04/2020, prepared on 12/08/2020 and analyzed on 12/29/2020 and 12/30/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred	Reported
From	to
Nuclide	Nuclide
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Po-216	Pb-212
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-214

Case Narrative

Page 51 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Job ID: 160-40635-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Th-227 Pb-211
Bi-214 Ra-226

Gamma prep batch 491180

The method blank (MB) z-score is within limits and is stored in the level IV raw data: (MB 160-491180/1-A).

The cesium-137 detection goal of 0.0700 pCi/g was not met. This was due to statistical fluctuations in the Compton background from low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline:
HPPG-ESU-TU077B-024 (160-40635-24).

The radium-226 detection goal of 0.200 pCi/g was not met. This was due to statistical fluctuations in the Compton background from low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline:
HPPG-ESU-TU077B-025 (160-40635-25).

Gamma prep batch 491176

The MB z-score for Pa-234 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances: (MB 160-491176/1-A).

The cesium-137 detection goal of 0.0700 pCi/g was not met. This was due to statistical fluctuations in the Compton background from low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline:
HPPG-ESU-TU077B-001 (160-40635-1), HPPG-ESU-TU077B-002 (160-40635-2), HPPG-ESU-TU077B-006 (160-40635-6),
HPPG-ESU-TU077B-009 (160-40635-9), HPPG-ESU-TU077B-018 (160-40635-18), HPPG-ESU-TU077B-020 (160-40635-20), and
(160-40635-A-20-C DU).

The replicate precision Th-234/U-238 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances: (160-40635-A-20-C DU).

The Ra-226 detection goal of 0.2 pCi/g was not met. This was due to statistical fluctuations in the Compton background from low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline: HPPG-ESU-TU077B-002 (160-40635-2), and HPPG-ESU-TU077B-014 (160-40635-14).

The method blank (MB) Z-score is within limits and is located in the level IV raw data: (MB 160-491176/1-A).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-049

Page 2 of 4

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 501197

Hunters Point Naval Shipyard: Parcel
Project Name: G Remedial Action

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Murri, Andrew
Sample Tech(s): Paul Leblanc

Project Number: 501197

Hunters Point Naval Shipyard: Parcel
Project Name: G Remedial Action

Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 12/2/2020

Waybill Number: 4157 0225 6137
Test America (St. Louis Lab)
Lab Destination: 13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8866

Analysis Requested						
Strontium-90 (EPA 905 M0D)						
Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma						
Matrix	# of Containers	Preservatives (soil)	Preservatives (water)	Dose Rate uR/Hr	Evidence Bag ID	Comment

Collection Information

Sample ID	Date	Time	Method	Container Type		
HPPG-ESU-TU077B-009	12/1/2020	11:46	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-010	12/1/2020	11:50	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-011	12/1/2020	11:52	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-012	12/1/2020	12:09	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-013	12/1/2020	13:07	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-014	12/1/2020	13:09	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-015	12/1/2020	13:12	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-016	12/1/2020	13:14	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-017	12/1/2020	13:16	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-018	12/1/2020	13:18	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-019	12/1/2020	13:21	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-020	12/1/2020	13:23	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-021	12/1/2020	13:25	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-022	12/1/2020	13:26	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-023	12/1/2020	13:28	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-024	12/1/2020	13:30	G	SO	1	16 oz. plastic jar
HPPG-ESU-TU077B-025	12/1/2020	13:32	G	SO	1	16 oz. plastic jar



APTIM

CHAIN OF CUSTODY

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Number: 501197

Hunters Project Name: G Rem

Dominant Mammals in South Africa

Phone #: (619)213-3389

Send Report to: Rose Conall
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Tech(s): Paul Lehman

Project Number: 501197		Analysis Requested			
Hunters Point Naval Shipyard; Parcel G Remedial Action					
Project Location: San Francisco, CA	Purchase Order #: 1159058				
Shipment/Pickup Date: 12/22/2020	Waybill Number: 1957 0225 6137				
Gamma Spec (EPA 901.1 M) - Full day in growth gamma	Strontium-90 (EPA 905 MOD)			Dose Rate uR/Hr	Evidence Bag ID
Rhonda Ridenbower (314)298-8566	Rhonda Ridenbower (314)298-8566				Comment
		# of Containers	Preservatives (soil)		
			Preservatives (water)		
Collection Information					
Sample ID	Date	Time	Method	Container Type	
HPPG-F-051	12/1/2020	11:46	G	SO 1	16 oz. plastic jar
HPPG-F-052	12/1/2020	13:28	G	SO 1	16 oz. plastic jar
Sample Tech(s): Paul Leblanc					
Send Report to: Rose Condit Phone/Fax Number: 415-987-0760 Address: 4005 Port Chicago Hwy City: Concord, CA 94520					
Project Manager: Lisa Bercik Phone #: (619)213-3389					
Sample Lead: Murri, Andrew					
APTIM Federal Services, LLC 4005 Port Chicago Hwy Concord, CA 94520					

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All Transfers for COC 501197RSY-049

Page 4 of 4

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew		12/01/2020 17:42	Locked Storage (RKillpack)		12/01/2020 17:42
Locked Storage (RKillpack)		12/02/2020 10:21	Devin Lewis		12/02/2020 10:21
Devin Lewis		12/02/2020 15:43	SHIPPEDTOLAB		

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40635-1

SDG Number: GJ46599741

Login Number: 40635**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Greer, Diane A

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Page 57 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Qualifiers

Rad

Qualifier

Qualifier Description

U Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 58 of 95

Job ID: 160-40635-1
SDG: GJ46599741

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Page 59 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40635-1	HPPG-ESU-TU077B-001	Solid	12/01/20 11:32	12/03/20 09:55	
160-40635-2	HPPG-ESU-TU077B-002	Solid	12/01/20 11:34	12/03/20 09:55	
160-40635-3	HPPG-ESU-TU077B-003	Solid	12/01/20 11:36	12/03/20 09:55	
160-40635-4	HPPG-ESU-TU077B-004	Solid	12/01/20 11:38	12/03/20 09:55	
160-40635-5	HPPG-ESU-TU077B-005	Solid	12/01/20 11:40	12/03/20 09:55	
160-40635-6	HPPG-ESU-TU077B-006	Solid	12/01/20 11:41	12/03/20 09:55	
160-40635-7	HPPG-ESU-TU077B-007	Solid	12/01/20 11:43	12/03/20 09:55	
160-40635-8	HPPG-ESU-TU077B-008	Solid	12/01/20 11:45	12/03/20 09:55	
160-40635-9	HPPG-ESU-TU077B-009	Solid	12/01/20 11:46	12/03/20 09:55	
160-40635-10	HPPG-ESU-TU077B-010	Solid	12/01/20 11:50	12/03/20 09:55	
160-40635-11	HPPG-ESU-TU077B-011	Solid	12/01/20 11:52	12/03/20 09:55	
160-40635-12	HPPG-ESU-TU077B-012	Solid	12/01/20 12:09	12/03/20 09:55	
160-40635-13	HPPG-ESU-TU077B-013	Solid	12/01/20 13:07	12/03/20 09:55	
160-40635-14	HPPG-ESU-TU077B-014	Solid	12/01/20 13:09	12/03/20 09:55	
160-40635-15	HPPG-ESU-TU077B-015	Solid	12/01/20 13:12	12/03/20 09:55	
160-40635-16	HPPG-ESU-TU077B-016	Solid	12/01/20 13:14	12/03/20 09:55	
160-40635-17	HPPG-ESU-TU077B-017	Solid	12/01/20 13:16	12/03/20 09:55	
160-40635-18	HPPG-ESU-TU077B-018	Solid	12/01/20 13:18	12/03/20 09:55	
160-40635-19	HPPG-ESU-TU077B-019	Solid	12/01/20 13:21	12/03/20 09:55	
160-40635-20	HPPG-ESU-TU077B-020	Solid	12/01/20 13:23	12/03/20 09:55	
160-40635-21	HPPG-ESU-TU077B-021	Solid	12/01/20 13:25	12/03/20 09:55	
160-40635-22	HPPG-ESU-TU077B-022	Solid	12/01/20 13:26	12/03/20 09:55	
160-40635-23	HPPG-ESU-TU077B-023	Solid	12/01/20 13:28	12/03/20 09:55	
160-40635-24	HPPG-ESU-TU077B-024	Solid	12/01/20 13:30	12/03/20 09:55	
160-40635-25	HPPG-ESU-TU077B-025	Solid	12/01/20 13:32	12/03/20 09:55	
160-40635-26	HPPG-F-051	Solid	12/01/20 11:46	12/03/20 09:55	
160-40635-27	HPPG-F-052	Solid	12/01/20 13:28	12/03/20 09:55	

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 60 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-001

Lab Sample ID: 160-40635-1

Matrix: Solid

Date Collected: 12/01/20 11:32

Date Received: 12/03/20 09:55

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.216		0.162	0.163	0.331	0.115	pCi/g	12/09/20 18:42	12/18/20 20:19	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	88.2		40 - 110					12/09/20 18:42	12/18/20 20:19	1
Y Carrier	92.7		40 - 110					12/09/20 18:42	12/18/20 20:19	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.531		0.194	0.203		0.0393	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Actinium-227	0.0162	U	0.0690	0.0691		0.473	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Bismuth-212	0.641	U	1.15	1.15		0.892	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Bismuth-214	0.482		0.155	0.165		0.0604	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Cesium-137	0.0147	U	0.0967	0.0967	0.0700	0.0785	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Lead-210	0.734	U	1.90	1.91		1.52	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Lead-212	0.527		0.113	0.129		0.0536	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Lead-214	0.474		0.132	0.143		0.115	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Potassium-40	7.70		1.49	1.73		0.347	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Protactinium-231	-0.0610	U	3.46	3.46		2.85	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Protactinium-234	0.140	U	0.384	0.385		0.277	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Radium-226	0.482		0.155	0.165	0.200	0.0604	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Radium-228	0.531		0.194	0.203		0.0393	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Thallium-208	0.137		0.0973	0.0986		0.0448	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Thorium 228	0.527		0.113	0.129		0.0536	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Thorium-232	0.531		0.194	0.203		0.0393	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Thorium-234	-0.708	U	0.749	0.754		0.992	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Uranium-235	-0.0263	U	0.783	0.783		0.491	pCi/g	12/08/20 13:20	12/29/20 10:58	1
Uranium-238	-0.708	U	0.749	0.754		0.992	pCi/g	12/08/20 13:20	12/29/20 10:58	1

Client Sample ID: HPPG-ESU-TU077B-002

Lab Sample ID: 160-40635-2

Matrix: Solid

Date Collected: 12/01/20 11:34

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.160		0.259	0.260		0.147	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Actinium-227	0.160	U	0.357	0.358		0.229	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Bismuth-212	-0.0873	U	0.843	0.843		1.02	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Bismuth-214	0.187	U	0.104	0.106		0.273	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Cesium-137	-0.0538	U	0.168	0.168	0.0700	0.0829	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Lead-210	-0.362	U	1.20	1.20		0.893	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Lead-212	0.348		0.102	0.112		0.0445	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Lead-214	0.123		0.140	0.140		0.103	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Potassium-40	5.73		1.68	1.78		0.555	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Protactinium-231	0.000	U	0.775	0.775		2.42	pCi/g	12/08/20 13:20	12/29/20 11:01	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 61 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-002

Lab Sample ID: 160-40635-2

Matrix: Solid

Date Collected: 12/01/20 11:34

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0790	U	0.0707	0.0711		0.175	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Radium-226	0.187	U	0.104	0.106	0.200	0.273	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Radium-228	0.160		0.259	0.260		0.147	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Thallium-208	0.0314	U	0.0834	0.0834		0.0488	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Thorium 228	0.348		0.102	0.112		0.0445	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Thorium-232	0.160		0.259	0.260		0.147	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Thorium-234	0.568		0.514	0.518		0.383	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Uranium-235	0.0136	U	0.0401	0.0401		0.289	pCi/g	12/08/20 13:20	12/29/20 11:01	1
Uranium-238	0.568		0.514	0.518		0.383	pCi/g	12/08/20 13:20	12/29/20 11:01	1

Client Sample ID: HPPG-ESU-TU077B-003

Lab Sample ID: 160-40635-3

Matrix: Solid

Date Collected: 12/01/20 11:36

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.259		0.190	0.192		0.0961	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Actinium-227	0.141	U	0.368	0.369		0.315	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Bismuth-212	0.383	U	0.715	0.717		0.549	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Bismuth-214	0.403		0.156	0.162		0.0629	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Cesium-137	0.00587	U	0.0543	0.0543	0.0700	0.0441	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Lead-210	-1.30	U	1.79	1.80		1.52	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Lead-212	0.375		0.0898	0.102		0.0438	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Lead-214	0.374		0.111	0.117		0.0607	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Potassium-40	6.95		1.49	1.65		0.497	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Protactinium-231	0.562	U	1.83	1.83		2.01	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Protactinium-234	0.00104	U	0.00237	0.00237		0.249	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Radium-226	0.403		0.156	0.162	0.200	0.0629	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Radium-228	0.259		0.190	0.192		0.0961	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Thallium-208	0.158		0.0597	0.0619		0.0223	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Thorium 228	0.375		0.0898	0.102		0.0438	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Thorium-232	0.259		0.190	0.192		0.0961	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Thorium-234	0.333	U	0.543	0.545		0.422	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Uranium-235	0.232	U	0.347	0.347		0.393	pCi/g	12/08/20 13:20	12/29/20 11:59	1
Uranium-238	0.333	U	0.543	0.545		0.422	pCi/g	12/08/20 13:20	12/29/20 11:59	1

Client Sample ID: HPPG-ESU-TU077B-004

Lab Sample ID: 160-40635-4

Matrix: Solid

Date Collected: 12/01/20 11:38

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.541		0.153	0.163		0.0947	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Actinium-227	0.0616	U	0.106	0.106		0.304	pCi/g	12/08/20 13:20	12/29/20 12:02	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 62 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-004

Lab Sample ID: 160-40635-4

Matrix: Solid

Date Collected: 12/01/20 11:38

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-212	-0.258	U	0.585	0.585		0.537	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Bismuth-214	0.483		0.126	0.136		0.0369	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Cesium-137	0.0164	U	0.0333	0.0334	0.0700	0.0247	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Lead-210	1.11		1.19	1.20		0.818	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Lead-212	0.536		0.0980	0.120		0.0437	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Lead-214	0.364		0.109	0.115		0.0484	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Potassium-40	8.73		1.35	1.62		0.311	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Protactinium-231	0.550	U	1.74	1.75		1.91	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Protactinium-234	0.00512	U	0.0105	0.0105		0.199	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Radium-226	0.483		0.126	0.136	0.200	0.0369	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Radium-228	0.541		0.153	0.163		0.0947	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Thallium-208	0.240		0.0629	0.0677		0.0205	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Thorium 228	0.536		0.0980	0.120		0.0437	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Thorium-232	0.541		0.153	0.163		0.0947	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Thorium-234	-0.327	U	0.904	0.905		0.753	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Uranium-235	0.125	U	0.318	0.319		0.256	pCi/g	12/08/20 13:20	12/29/20 12:02	1
Uranium-238	-0.327	U	0.904	0.905		0.753	pCi/g	12/08/20 13:20	12/29/20 12:02	1

Client Sample ID: HPPG-ESU-TU077B-005

Lab Sample ID: 160-40635-5

Matrix: Solid

Date Collected: 12/01/20 11:40

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.175		0.207	0.208		0.158	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Actinium-227	0.180	U	0.221	0.222		0.186	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Bismuth-212	0.00956	U	0.902	0.902		0.742	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Bismuth-214	0.375		0.123	0.129		0.0443	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Cesium-137	0.0225	U	0.0476	0.0477	0.0700	0.0354	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Lead-210	1.69		1.01	1.03		0.588	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Lead-212	0.407		0.0924	0.102		0.0413	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Lead-214	0.358		0.102	0.108		0.0473	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Potassium-40	5.88		1.36	1.49		0.256	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Protactinium-231	0.700	U	2.58	2.58		2.10	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Protactinium-234	-0.0158	U	0.0406	0.0406		0.242	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Radium-226	0.375		0.123	0.129	0.200	0.0443	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Radium-228	0.175		0.207	0.208		0.158	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Thallium-208	0.0530		0.104	0.104		0.0411	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Thorium 228	0.407		0.0924	0.102		0.0413	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Thorium-232	0.175		0.207	0.208		0.158	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Thorium-234	0.455	U	0.497	0.500		0.496	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Uranium-235	0.0561	U	0.144	0.144		0.455	pCi/g	12/08/20 13:20	12/29/20 12:00	1
Uranium-238	0.455	U	0.497	0.500		0.496	pCi/g	12/08/20 13:20	12/29/20 12:00	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 63 of 95

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-006

Lab Sample ID: 160-40635-6

Matrix: Solid

Date Collected: 12/01/20 11:41

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.632		0.213	0.222		0.141	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Actinium-227	0.277	U	0.537	0.538		0.318	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Bismuth-212	0.0425	U	0.945	0.945		0.775	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Bismuth-214	0.588		0.148	0.160		0.0540	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Cesium-137	-0.0578	U	0.0960	0.0962	0.0700	0.0748	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Lead-210	1.73		2.38	2.39		1.41	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Lead-212	0.450		0.114	0.123		0.0630	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Lead-214	0.617		0.161	0.172		0.0700	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Potassium-40	10.2		1.57	1.88		0.141	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Protactinium-231	0.797	U	2.32	2.32		2.54	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Protactinium-234	0.0485	U	0.351	0.351		0.287	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Radium-226	0.588		0.148	0.160	0.200	0.0540	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Radium-228	0.632		0.213	0.222		0.141	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Thallium-208	0.231		0.0729	0.0765		0.0192	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Thorium 228	0.450		0.114	0.123		0.0630	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Thorium-232	0.632		0.213	0.222		0.141	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Thorium-234	1.42		0.862	0.877		0.504	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Uranium-235	0.120	U	0.253	0.254		0.488	pCi/g	12/08/20 13:20	12/29/20 12:05	1
Uranium-238	1.42		0.862	0.877		0.504	pCi/g	12/08/20 13:20	12/29/20 12:05	1

Client Sample ID: HPPG-ESU-TU077B-007

Lab Sample ID: 160-40635-7

Matrix: Solid

Date Collected: 12/01/20 11:43

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.390		0.162	0.167		0.0534	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Actinium-227	0.0832	U	0.172	0.172		0.351	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Bismuth-212	0.0166	U	0.553	0.553		0.454	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Bismuth-214	0.282		0.0944	0.0988		0.0428	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Cesium-137	0.0119	U	0.0454	0.0454	0.0700	0.0241	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Lead-210	-0.211	U	1.11	1.11		0.901	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Lead-212	0.403		0.118	0.129		0.0811	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Lead-214	0.391		0.105	0.113		0.0601	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Potassium-40	7.82		1.13	1.38		0.0944	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Protactinium-231	0.611	U	1.02	1.02		1.36	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Protactinium-234	0.00841	U	0.0145	0.0145		0.195	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Radium-226	0.282		0.0944	0.0988	0.200	0.0428	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Radium-228	0.390		0.162	0.167		0.0534	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Thallium-208	0.124		0.0409	0.0429		0.0112	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Thorium 228	0.403		0.118	0.129		0.0811	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Thorium-232	0.390		0.162	0.167		0.0534	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Thorium-234	0.000	U	0.365	0.365		0.790	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Uranium-235	0.0692	U	0.0713	0.0716		0.333	pCi/g	12/08/20 13:20	12/29/20 12:06	1
Uranium-238	0.000	U	0.365	0.365		0.790	pCi/g	12/08/20 13:20	12/29/20 12:06	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 64 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-008

Lab Sample ID: 160-40635-8

Matrix: Solid

Date Collected: 12/01/20 11:45

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.553		0.224	0.233		0.131	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Actinium-227	0.249	U	0.426	0.427		0.393	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Bismuth-212	0.426	U	0.834	0.836		0.637	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Bismuth-214	0.413		0.145	0.153		0.0629	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Cesium-137	0.0912		0.0546	0.0556	0.0700	0.0290	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Lead-210	-1.43	U	2.42	2.43		2.04	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Lead-212	0.428		0.107	0.118		0.0525	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Lead-214	0.408		0.126	0.135		0.0735	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Potassium-40	6.84		1.45	1.65		0.365	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Protactinium-231	0.808	U	2.35	2.35		2.70	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Protactinium-234	0.147	U	0.273	0.274		0.269	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Radium-226	0.413		0.145	0.153	0.200	0.0629	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Radium-228	0.553		0.224	0.233		0.131	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Thallium-208	0.153		0.0759	0.0779		0.0338	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Thorium 228	0.428		0.107	0.118		0.0525	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Thorium-232	0.553		0.224	0.233		0.131	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Thorium-234	-0.850	U	1.04	1.05		0.733	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Uranium-235	0.00712	U	0.647	0.647		0.532	pCi/g	12/08/20 13:20	12/29/20 12:08	1
Uranium-238	-0.850	U	1.04	1.05		0.733	pCi/g	12/08/20 13:20	12/29/20 12:08	1

Client Sample ID: HPPG-ESU-TU077B-009

Lab Sample ID: 160-40635-9

Matrix: Solid

Date Collected: 12/01/20 11:46

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.415		0.182	0.186		0.0475	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Actinium-227	0.131	U	0.292	0.292		0.227	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Bismuth-212	-0.00506	U	0.854	0.854		0.499	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Bismuth-214	0.218		0.159	0.161		0.0952	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Cesium-137	-0.00480	U	0.0857	0.0857	0.0700	0.0709	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Lead-210	0.694		0.949	0.953		0.663	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Lead-212	0.352		0.0945	0.105		0.0419	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Lead-214	0.178		0.118	0.120		0.0739	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Potassium-40	2.90		1.83	1.86		0.833	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Protactinium-231	-0.936	U	2.62	2.63		2.11	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Protactinium-234	0.0388	U	0.0814	0.0815		0.185	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Radium-226	0.218		0.159	0.161	0.200	0.0952	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Radium-228	0.415		0.182	0.186		0.0475	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Thallium-208	0.104		0.105	0.105		0.0428	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Thorium 228	0.352		0.0945	0.105		0.0419	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Thorium-232	0.415		0.182	0.186		0.0475	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Thorium-234	0.488		0.567	0.569		0.377	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Uranium-235	0.0867	U	0.278	0.278		0.222	pCi/g	12/08/20 13:20	12/29/20 12:07	1
Uranium-238	0.488		0.567	0.569		0.377	pCi/g	12/08/20 13:20	12/29/20 12:07	1

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Client Sample Results

Page 65 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-010

Lab Sample ID: 160-40635-10

Matrix: Solid

Date Collected: 12/01/20 11:50

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.687		0.223	0.234		0.0454	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Actinium-227	-0.400	U	0.855	0.856		0.516	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Bismuth-212	0.377	U	0.894	0.895		0.691	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Bismuth-214	0.406		0.179	0.184		0.0948	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Cesium-137	0.0128	U	0.0698	0.0698	0.0700	0.0557	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Lead-210	2.42		1.33	1.36		0.721	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Lead-212	0.522		0.117	0.135		0.0560	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Lead-214	0.378		0.177	0.181		0.0938	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Potassium-40	7.86		1.82	1.99		0.525	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Protactinium-231	0.744	U	2.11	2.11		2.31	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Protactinium-234	0.0760	U	0.108	0.108		0.219	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Radium-226	0.406		0.179	0.184	0.200	0.0948	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Radium-228	0.687		0.223	0.234		0.0454	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Thallium-208	0.198		0.0638	0.0671		0.0172	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Thorium 228	0.522		0.117	0.135		0.0560	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Thorium-232	0.687		0.223	0.234		0.0454	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Thorium-234	0.865		0.571	0.579		0.425	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Uranium-235	0.115	U	0.329	0.329		0.269	pCi/g	12/08/20 13:20	12/29/20 13:32	1
Uranium-238	0.865		0.571	0.579		0.425	pCi/g	12/08/20 13:20	12/29/20 13:32	1

Client Sample ID: HPPG-ESU-TU077B-011

Lab Sample ID: 160-40635-11

Matrix: Solid

Date Collected: 12/01/20 11:52

Date Received: 12/03/20 09:55

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	0.0144	U	0.151	0.151	0.331	0.123	pCi/g	12/09/20 18:42	12/18/20 20:19	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	91.4		40 - 110					12/09/20 18:42	12/18/20 20:19	1
Y Carrier	94.2		40 - 110					12/09/20 18:42	12/18/20 20:19	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.219		0.109	0.111		0.138	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Actinium-227	-0.0830	U	0.314	0.314		0.360	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Bismuth-212	-0.326	U	0.596	0.597		0.616	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Bismuth-214	0.382		0.127	0.133		0.0455	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Cesium-137	-0.0220	U	0.0600	0.0600	0.0700	0.0473	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Lead-210	0.547	U	1.25	1.25		0.985	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Lead-212	0.408		0.0948	0.109		0.0489	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Lead-214	0.409		0.0960	0.105		0.0579	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Potassium-40	6.29		1.20	1.36		0.327	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Protactinium-231	0.0955	U	1.21	1.21		2.27	pCi/g	12/08/20 13:20	12/29/20 12:52	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 66 of 95

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-011

Lab Sample ID: 160-40635-11

Matrix: Solid

Date Collected: 12/01/20 11:52

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.105	U	0.196	0.197		0.142	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Radium-226	0.382		0.127	0.133	0.200	0.0455	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Radium-228	0.219		0.109	0.111		0.138	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Thallium-208	0.0623		0.0389	0.0395		0.0465	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Thorium 228	0.408		0.0948	0.109		0.0489	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Thorium-232	0.219		0.109	0.111		0.138	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Thorium-234	0.113	U	0.196	0.196		0.721	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Uranium-235	0.312		0.170	0.173		0.0881	pCi/g	12/08/20 13:20	12/29/20 12:52	1
Uranium-238	0.113	U	0.196	0.196		0.721	pCi/g	12/08/20 13:20	12/29/20 12:52	1

Client Sample ID: HPPG-ESU-TU077B-012

Lab Sample ID: 160-40635-12

Matrix: Solid

Date Collected: 12/01/20 12:09

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.294		0.201	0.204		0.0902	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Actinium-227	0.00794	U	0.540	0.540		0.336	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Bismuth-212	-0.435	U	1.13	1.13		0.894	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Bismuth-214	0.341		0.136	0.141		0.0575	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Cesium-137	-0.00371	U	0.0575	0.0575	0.0700	0.0469	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Lead-210	0.622	U	1.46	1.46		0.995	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Lead-212	0.309		0.0823	0.0884		0.0390	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Lead-214	0.366		0.122	0.127		0.0488	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Potassium-40	4.49		1.19	1.28		0.254	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Protactinium-231	0.398	U	1.47	1.47		2.04	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Protactinium-234	0.0885	U	0.134	0.135		0.222	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Radium-226	0.341		0.136	0.141	0.200	0.0575	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Radium-228	0.294		0.201	0.204		0.0902	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Thallium-208	0.0917		0.0757	0.0763		0.0352	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Thorium 228	0.309		0.0823	0.0884		0.0390	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Thorium-232	0.294		0.201	0.204		0.0902	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Thorium-234	0.538		0.502	0.506		0.330	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Uranium-235	0.155	U	0.356	0.357		0.374	pCi/g	12/08/20 13:20	12/29/20 12:54	1
Uranium-238	0.538		0.502	0.506		0.330	pCi/g	12/08/20 13:20	12/29/20 12:54	1

Client Sample ID: HPPG-ESU-TU077B-013

Lab Sample ID: 160-40635-13

Matrix: Solid

Date Collected: 12/01/20 13:07

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.508		0.151	0.160		0.0236	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Actinium-227	0.106	U	0.287	0.287		0.282	pCi/g	12/08/20 13:20	12/29/20 13:07	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 67 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-013

Lab Sample ID: 160-40635-13

Matrix: Solid

Date Collected: 12/01/20 13:07

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Bismuth-212	-0.0958	U	0.542	0.543		0.522	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Bismuth-214	0.0859	U	0.0651	0.0657		0.133	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Cesium-137	-0.0180	U	0.0512	0.0512	0.0700	0.0406	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Lead-210	-0.0190	U	1.27	1.27		1.05	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Lead-212	0.459		0.0805	0.100		0.0343	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Lead-214	0.462		0.0973	0.108		0.0398	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Potassium-40	7.16		1.12	1.34		0.264	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Protactinium-231	-0.758	U	2.44	2.44		1.98	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Protactinium-234	-0.106	U	0.304	0.304		0.247	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Radium-226	0.0859	U	0.0651	0.0657	0.200	0.133	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Radium-228	0.508		0.151	0.160		0.0236	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Thallium-208	0.181		0.0485	0.0520		0.0154	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Thorium 228	0.459		0.0805	0.100		0.0343	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Thorium-232	0.508		0.151	0.160		0.0236	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Thorium-234	0.258	U	0.778	0.779		0.783	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Uranium-235	-0.0888	U	0.280	0.280		0.471	pCi/g	12/08/20 13:20	12/29/20 13:07	1
Uranium-238	0.258	U	0.778	0.779		0.783	pCi/g	12/08/20 13:20	12/29/20 13:07	1

Client Sample ID: HPPG-ESU-TU077B-014

Lab Sample ID: 160-40635-14

Matrix: Solid

Date Collected: 12/01/20 13:09

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.546		0.164	0.174		0.0420	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Actinium-227	-0.264	U	0.734	0.735		0.425	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Bismuth-212	0.716	U	1.38	1.38		1.09	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Bismuth-214	0.110	U	0.135	0.136		0.237	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Cesium-137	-0.0315	U	0.0740	0.0740	0.0700	0.0576	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Lead-210	-1.19	U	1.03	1.04		1.66	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Lead-212	0.283		0.0994	0.106		0.0594	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Lead-214	0.446		0.112	0.121		0.0380	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Potassium-40	5.73		1.35	1.47		0.312	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Protactinium-231	-1.15	U	3.48	3.49		2.83	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Protactinium-234	0.160	U	0.271	0.271		0.245	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Radium-226	0.110	U	0.135	0.136	0.200	0.237	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Radium-228	0.546		0.164	0.174		0.0420	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Thallium-208	0.0682		0.0515	0.0520		0.0551	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Thorium 228	0.283		0.0994	0.106		0.0594	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Thorium-232	0.546		0.164	0.174		0.0420	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Thorium-234	0.394	U	0.606	0.607		0.469	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Uranium-235	-0.00948	U	0.323	0.323		0.428	pCi/g	12/08/20 13:20	12/29/20 13:21	1
Uranium-238	0.394	U	0.606	0.607		0.469	pCi/g	12/08/20 13:20	12/29/20 13:21	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 68 of 95

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-015

Lab Sample ID: 160-40635-15

Matrix: Solid

Date Collected: 12/01/20 13:12
Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.289		0.149	0.152		0.0538	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Actinium-227	-0.0678	U	0.551	0.551		0.325	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Bismuth-212	-0.273	U	0.635	0.636		0.499	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Bismuth-214	0.315		0.0909	0.0966		0.0374	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Cesium-137	-0.0398	U	0.0603	0.0604	0.0700	0.0466	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Lead-210	0.547	U	1.10	1.10		0.870	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Lead-212	0.359		0.0735	0.0870		0.0331	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Lead-214	0.322		0.0891	0.0952		0.0475	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Potassium-40	6.32		1.02	1.20		0.0950	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Protactinium-231	0.000	U	0.226	0.226		1.72	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Protactinium-234	-0.0863	U	0.224	0.224		0.181	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Radium-226	0.315		0.0909	0.0966	0.200	0.0374	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Radium-228	0.289		0.149	0.152		0.0538	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Thallium-208	0.104		0.0653	0.0662		0.0312	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Thorium 228	0.359		0.0735	0.0870		0.0331	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Thorium-232	0.289		0.149	0.152		0.0538	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Thorium-234	-0.107	U	0.311	0.311		0.758	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Uranium-235	-0.156	U	0.423	0.423		0.344	pCi/g	12/08/20 13:20	12/29/20 12:57	1
Uranium-238	-0.107	U	0.311	0.311		0.758	pCi/g	12/08/20 13:20	12/29/20 12:57	1

Client Sample ID: HPPG-ESU-TU077B-016

Lab Sample ID: 160-40635-16

Matrix: Solid

Date Collected: 12/01/20 13:14
Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.639		0.222	0.234		0.0451	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Actinium-227	-0.166	U	0.780	0.780		0.470	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Bismuth-212	0.000	U	0.563	0.563		0.803	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Bismuth-214	0.427		0.173	0.180		0.0749	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Cesium-137	0.0342	U	0.0856	0.0857	0.0700	0.0670	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Lead-210	0.331	U	1.55	1.56		1.15	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Lead-212	0.400		0.119	0.128		0.0671	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Lead-214	0.408		0.134	0.142		0.0585	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Potassium-40	5.81		1.41	1.56		0.398	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Protactinium-231	0.247	U	1.93	1.93		2.98	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Protactinium-234	0.144	U	0.316	0.317		0.294	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Radium-226	0.427		0.173	0.180	0.200	0.0749	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Radium-228	0.639		0.222	0.234		0.0451	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thallium-208	0.195		0.0675	0.0711		0.0223	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thorium 228	0.400		0.119	0.128		0.0671	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thorium-232	0.639		0.222	0.234		0.0451	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thorium-234	1.05		1.00	1.01		0.601	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Uranium-235	-0.0302	U	0.414	0.414		0.530	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Uranium-238	1.05		1.00	1.01		0.601	pCi/g	12/08/20 13:20	12/29/20 14:14	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Page 69 of 95

 Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40635-1
 SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-017
Lab Sample ID: 160-40635-17

Matrix: Solid

 Date Collected: 12/01/20 13:16
 Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.424		0.194	0.198		0.107	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Actinium-227	-0.438	U	0.935	0.937		0.564	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Bismuth-212	0.468	U	0.967	0.968		0.740	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Bismuth-214	0.318		0.199	0.202		0.0932	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Cesium-137	0.0140	U	0.0843	0.0843	0.0700	0.0676	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Lead-210	-0.250	U	1.49	1.49		1.08	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Lead-212	0.362		0.106	0.116		0.0481	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Lead-214	0.456		0.189	0.195		0.122	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Potassium-40	6.65		1.57	1.71		0.339	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Protactinium-231	0.0000003	U	3.67	3.67		3.02	pCi/g	12/08/20 13:20	12/29/20 12:55	1
	27									
Protactinium-234	0.0402	U	0.0956	0.0957		0.182	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Radium-226	0.318		0.199	0.202	0.200	0.0932	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Radium-228	0.424		0.194	0.198		0.107	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Thallium-208	0.133		0.0571	0.0587		0.0188	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Thorium 228	0.362		0.106	0.116		0.0481	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Thorium-232	0.424		0.194	0.198		0.107	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Thorium-234	0.890		0.630	0.638		0.496	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Uranium-235	0.174	U	0.314	0.314		0.257	pCi/g	12/08/20 13:20	12/29/20 12:55	1
Uranium-238	0.890		0.630	0.638		0.496	pCi/g	12/08/20 13:20	12/29/20 12:55	1

Client Sample ID: HPPG-ESU-TU077B-018
Lab Sample ID: 160-40635-18

Matrix: Solid

 Date Collected: 12/01/20 13:18
 Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.523		0.290	0.295		0.123	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Actinium-227	0.0592	U	0.0938	0.0941		0.453	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Bismuth-212	0.000	U	0.697	0.697		0.653	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Bismuth-214	0.587		0.152	0.164		0.0563	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Cesium-137	-0.0598	U	0.0923	0.0925	0.0700	0.0715	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Lead-210	-0.662	U	1.96	1.96		1.64	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Lead-212	0.461		0.109	0.124		0.0591	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Lead-214	0.452		0.125	0.133		0.0770	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Potassium-40	7.60		1.45	1.65		0.279	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Protactinium-231	0.000	U	0.368	0.368		2.42	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Protactinium-234	-0.136	U	0.360	0.360		0.293	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Radium-226	0.587		0.152	0.164	0.200	0.0563	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Radium-228	0.523		0.290	0.295		0.123	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thallium-208	0.195		0.0584	0.0618		0.0174	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thorium 228	0.461		0.109	0.124		0.0591	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thorium-232	0.523		0.290	0.295		0.123	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Thorium-234	-0.478	U	1.45	1.45		1.20	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Uranium-235	0.122	U	0.276	0.277		0.318	pCi/g	12/08/20 13:20	12/29/20 14:14	1
Uranium-238	-0.478	U	1.45	1.45		1.20	pCi/g	12/08/20 13:20	12/29/20 14:14	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 70 of 95

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-019

Lab Sample ID: 160-40635-19

Date Collected: 12/01/20 13:21

Matrix: Solid

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.431		0.185	0.190		0.0705	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Actinium-227	0.0814	U	0.169	0.169		0.310	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Bismuth-212	-0.303	U	0.625	0.626		0.490	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Bismuth-214	0.305		0.104	0.108		0.0476	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Cesium-137	-0.0418	U	0.0683	0.0684	0.0700	0.0536	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Lead-210	-0.251	U	1.35	1.35		1.10	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Lead-212	0.363		0.0682	0.0828		0.0274	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Lead-214	0.361		0.110	0.116		0.0531	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Potassium-40	7.67		1.08	1.33		0.0880	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Protactinium-231	0.352	U	2.04	2.04		1.66	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Protactinium-234	0.0919	U	0.190	0.190		0.193	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Radium-226	0.305		0.104	0.108	0.200	0.0476	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Radium-228	0.431		0.185	0.190		0.0705	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Thallium-208	0.182		0.0470	0.0507		0.0134	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Thorium 228	0.363		0.0682	0.0828		0.0274	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Thorium-232	0.431		0.185	0.190		0.0705	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Thorium-234	0.000	U	0.437	0.437		0.832	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Uranium-235	0.000	U	0.162	0.162		0.329	pCi/g	12/08/20 13:20	12/29/20 13:30	1
Uranium-238	0.000	U	0.437	0.437		0.832	pCi/g	12/08/20 13:20	12/29/20 13:30	1

Client Sample ID: HPPG-ESU-TU077B-020

Lab Sample ID: 160-40635-20

Date Collected: 12/01/20 13:23

Matrix: Solid

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.163		0.264	0.265		0.149	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Actinium-227	0.0263	U	0.0485	0.0486		0.467	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Bismuth-212	-0.0386	U	0.803	0.803		0.831	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Bismuth-214	0.375		0.160	0.164		0.0859	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Cesium-137	-0.0748	U	0.0642	0.0647	0.0700	0.0784	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Lead-210	-0.805	U	1.81	1.81		1.32	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Lead-212	0.506		0.121	0.138		0.0598	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Lead-214	0.371		0.134	0.139		0.0888	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Potassium-40	9.35		1.83	2.06		0.333	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Protactinium-231	0.000	U	0.477	0.477		2.57	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Protactinium-234	0.0825	U	0.128	0.128		0.231	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Radium-226	0.375		0.160	0.164	0.200	0.0859	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Radium-228	0.163		0.264	0.265		0.149	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Thallium-208	0.195		0.0666	0.0696		0.0185	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Thorium 228	0.506		0.121	0.138		0.0598	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Thorium-232	0.163		0.264	0.265		0.149	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Thorium-234	0.857		0.538	0.546		0.382	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Uranium-235	0.0963	U	0.333	0.333		0.268	pCi/g	12/08/20 13:20	12/30/20 07:04	1
Uranium-238	0.857		0.538	0.546		0.382	pCi/g	12/08/20 13:20	12/30/20 07:04	1

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Client Sample Results

Page 71 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-021

Lab Sample ID: 160-40635-21

Matrix: Solid

Date Collected: 12/01/20 13:25

Date Received: 12/03/20 09:55

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.174		0.143	0.143	0.331	0.103	pCi/g	12/09/20 18:42	12/18/20 20:19	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	103		40 - 110					12/09/20 18:42	12/18/20 20:19	1
Y Carrier	94.2		40 - 110					12/09/20 18:42	12/18/20 20:19	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.268		0.222	0.223		0.112	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Actinium-227	0.246	U	0.550	0.551		0.329	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Bismuth-212	-0.0166	U	0.861	0.861		0.708	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Bismuth-214	0.436		0.146	0.152		0.0660	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Cesium-137	0.0219	U	0.0809	0.0809	0.0700	0.0648	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Lead-210	2.36		1.81	1.83		1.11	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Lead-212	0.488		0.105	0.117		0.0495	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Lead-214	0.449		0.132	0.139		0.0561	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Potassium-40	8.21		1.39	1.62		0.138	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Protactinium-231	0.000	U	0.764	0.764		2.45	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Protactinium-234	0.117	U	0.251	0.251		0.252	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Radium-226	0.436		0.146	0.152	0.200	0.0660	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Radium-228	0.268		0.222	0.223		0.112	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Thallium-208	0.210		0.0919	0.0944		0.0367	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Thorium 228	0.488		0.105	0.117		0.0495	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Thorium-232	0.268		0.222	0.223		0.112	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Thorium-234	1.29		0.803	0.815		0.459	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Uranium-235	-0.219	U	0.674	0.674		0.549	pCi/g	12/08/20 14:09	12/29/20 09:18	1
Uranium-238	1.29		0.803	0.815		0.459	pCi/g	12/08/20 14:09	12/29/20 09:18	1

Client Sample ID: HPPG-ESU-TU077B-022

Lab Sample ID: 160-40635-22

Date Collected: 12/01/20 13:26

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.582		0.201	0.210		0.107	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Actinium-227	0.103	U	0.203	0.203		0.175	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Bismuth-212	-0.0663	U	0.663	0.663		0.541	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Bismuth-214	0.279		0.107	0.111		0.0511	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Cesium-137	0.0729		0.0328	0.0337	0.0700	0.0138	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Lead-210	-0.614	U	1.35	1.35		1.08	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Lead-212	0.371		0.0741	0.0883		0.0329	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Lead-214	0.364		0.0879	0.0957		0.0387	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Potassium-40	6.47		1.09	1.28		0.196	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Protactinium-231	-0.00571	U	2.19	2.19		1.81	pCi/g	12/08/20 14:09	12/29/20 09:19	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 72 of 95

Job ID: 160-40635-1
SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-022

Lab Sample ID: 160-40635-22

Date Collected: 12/01/20 13:26

Matrix: Solid

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.126	U	0.207	0.208		0.175	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Radium-226	0.279		0.107	0.111	0.200	0.0511	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Radium-228	0.582		0.201	0.210		0.107	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Thallium-208	0.162		0.0502	0.0530		0.0137	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Thorium 228	0.371		0.0741	0.0883		0.0329	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Thorium-232	0.582		0.201	0.210		0.107	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Thorium-234	-0.328	U	1.07	1.08		0.878	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Uranium-235	0.000	U	0.152	0.152		0.312	pCi/g	12/08/20 14:09	12/29/20 09:19	1
Uranium-238	-0.328	U	1.07	1.08		0.878	pCi/g	12/08/20 14:09	12/29/20 09:19	1

Client Sample ID: HPPG-ESU-TU077B-023

Lab Sample ID: 160-40635-23

Date Collected: 12/01/20 13:28

Matrix: Solid

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.157		0.271	0.271		0.139	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Actinium-227	-0.0838	U	0.374	0.374		0.369	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Bismuth-212	-0.238	U	0.434	0.434		0.502	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Bismuth-214	0.276		0.108	0.112		0.0503	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Cesium-137	-0.0343	U	0.0662	0.0663	0.0700	0.0517	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Lead-210	-0.824	U	1.55	1.55		1.24	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Lead-212	0.336		0.0784	0.0896		0.0372	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Lead-214	0.324		0.0951	0.101		0.0473	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Potassium-40	5.43		1.56	1.65		0.623	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Protactinium-231	0.566	U	2.20	2.20		1.79	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Protactinium-234	0.0197	U	0.0335	0.0335		0.206	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Radium-226	0.276		0.108	0.112	0.200	0.0503	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Radium-228	0.157		0.271	0.271		0.139	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Thallium-208	0.0314	U	0.0819	0.0819		0.0411	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Thorium 228	0.336		0.0784	0.0896		0.0372	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Thorium-232	0.157		0.271	0.271		0.139	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Thorium-234	0.277	U	0.848	0.849		0.839	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Uranium-235	0.0622	U	0.190	0.190		0.363	pCi/g	12/08/20 14:09	12/29/20 09:24	1
Uranium-238	0.277	U	0.848	0.849		0.839	pCi/g	12/08/20 14:09	12/29/20 09:24	1

Client Sample ID: HPPG-ESU-TU077B-024

Lab Sample ID: 160-40635-24

Date Collected: 12/01/20 13:30

Matrix: Solid

Date Received: 12/03/20 09:55

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.610		0.218	0.227		0.132	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Actinium-227	0.224	U	0.404	0.405		0.312	pCi/g	12/08/20 14:09	12/29/20 09:21	1

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Client Sample Results

Page 73 of 95

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
 SDG: GJ46599741

Client Sample ID: HPPG-ESU-TU077B-024
Lab Sample ID: 160-40635-24
Matrix: Solid
Date Collected: 12/01/20 13:30
Date Received: 12/03/20 09:55
Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.000	U	0.432	0.432		0.433	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Bismuth-214	0.540		0.144	0.154		0.0509	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Cesium-137	-0.0642	U	0.0969	0.0971	0.0700	0.0749	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Lead-210	0.632	U	1.18	1.18		0.798	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Lead-212	0.290		0.120	0.125		0.0813	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Lead-214	0.496		0.144	0.153		0.0551	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Potassium-40	6.76		1.42	1.58		0.300	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Protactinium-231	-0.0000000	U	2.92	2.92		2.40	pCi/g	12/08/20 14:09	12/29/20 09:21	1
	666									
Protactinium-234	0.163	U	0.295	0.296		0.248	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Radium-226	0.540		0.144	0.154	0.200	0.0509	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Radium-228	0.610		0.218	0.227		0.132	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Thallium-208	0.0631		0.0887	0.0889		0.0489	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Thorium 228	0.290		0.120	0.125		0.0813	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Thorium-232	0.610		0.218	0.227		0.132	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Thorium-234	-0.0627	U	1.42	1.42		1.17	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Uranium-235	0.0629	U	0.350	0.350		0.448	pCi/g	12/08/20 14:09	12/29/20 09:21	1
Uranium-238	-0.0627	U	1.42	1.42		1.17	pCi/g	12/08/20 14:09	12/29/20 09:21	1

Client Sample ID: HPPG-ESU-TU077B-025
Lab Sample ID: 160-40635-25
Matrix: Solid
Date Collected: 12/01/20 13:32
Date Received: 12/03/20 09:55
Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.878		0.253	0.273		0.0426	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Actinium-227	0.184	U	0.509	0.509		0.426	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Bismuth-212	0.538	U	1.19	1.19		0.935	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Bismuth-214	-0.0569	U	0.270	0.270		0.225	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Cesium-137	0.0430	U	0.0832	0.0834	0.0700	0.0643	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Lead-210	0.933	U	1.65	1.66		1.18	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Lead-212	0.519		0.120	0.135		0.0599	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Lead-214	0.408		0.149	0.156		0.0722	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Potassium-40	8.28		1.61	1.87		0.377	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Protactinium-231	0.136	U	1.60	1.60		2.59	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Protactinium-234	0.143	U	0.352	0.353		0.321	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Radium-226	-0.0569	U	0.270	0.270	0.200	0.225	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Radium-228	0.878		0.253	0.273		0.0426	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Thallium-208	0.180		0.0704	0.0734		0.0278	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Thorium 228	0.519		0.120	0.135		0.0599	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Thorium-232	0.878		0.253	0.273		0.0426	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Thorium-234	-0.371	U	1.29	1.29		1.07	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Uranium-235	0.118	U	0.237	0.237		0.571	pCi/g	12/08/20 14:09	12/29/20 09:23	1
Uranium-238	-0.371	U	1.29	1.29		1.07	pCi/g	12/08/20 14:09	12/29/20 09:23	1

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Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Page 74 of 95

Job ID: 160-40635-1
 SDG: GJ46599741

Client Sample ID: HPPG-F-051

Date Collected: 12/01/20 11:46

Date Received: 12/03/20 09:55

Lab Sample ID: 160-40635-26

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.271		0.249	0.251		0.151	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Actinium-227	0.130	U	0.533	0.534		0.508	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Bismuth-212	-0.420	U	0.845	0.846		0.876	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Bismuth-214	0.430		0.204	0.209		0.0942	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Cesium-137	0.00302	U	0.0628	0.0628	0.0700	0.0509	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Lead-210	1.29		1.18	1.19		0.767	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Lead-212	0.441		0.102	0.117		0.0376	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Lead-214	0.333		0.118	0.123		0.0773	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Potassium-40	6.48		1.79	1.91		0.570	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Protactinium-231	0.000	U	0.416	0.416		2.40	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Protactinium-234	0.251		0.182	0.184		0.197	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Radium-226	0.430		0.204	0.209	0.200	0.0942	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Radium-228	0.271		0.249	0.251		0.151	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Thallium-208	0.0427	U	0.114	0.114		0.0502	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Thorium 228	0.441		0.102	0.117		0.0376	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Thorium-232	0.271		0.249	0.251		0.151	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Thorium-234	-0.203	U	1.02	1.02		0.847	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Uranium-235	0.110	U	0.332	0.332		0.266	pCi/g	12/08/20 14:09	12/29/20 09:25	1
Uranium-238	-0.203	U	1.02	1.02		0.847	pCi/g	12/08/20 14:09	12/29/20 09:25	1

Client Sample ID: HPPG-F-052

Date Collected: 12/01/20 13:28

Date Received: 12/03/20 09:55

Lab Sample ID: 160-40635-27

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.245		0.187	0.189		0.102	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Actinium-227	-0.381	U	0.763	0.765		0.460	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Bismuth-212	0.469	U	0.967	0.968		0.758	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Bismuth-214	0.380		0.133	0.138		0.0604	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Cesium-137	-0.0262	U	0.0635	0.0635	0.0700	0.0496	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Lead-210	0.274	U	1.19	1.19		0.877	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Lead-212	0.345		0.0969	0.107		0.0538	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Lead-214	0.404		0.122	0.129		0.0639	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Potassium-40	5.62		1.19	1.32		0.310	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Protactinium-231	0.000	U	0.753	0.753		2.19	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Protactinium-234	0.0151	U	0.0231	0.0231		0.262	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Radium-226	0.380		0.133	0.138	0.200	0.0604	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Radium-228	0.245		0.187	0.189		0.102	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Thallium-208	0.168		0.0610	0.0634		0.0236	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Thorium 228	0.345		0.0969	0.107		0.0538	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Thorium-232	0.245		0.187	0.189		0.102	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Thorium-234	0.533		0.660	0.662		0.474	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Uranium-235	0.198	U	0.362	0.363		0.261	pCi/g	12/08/20 14:09	12/29/20 10:04	1
Uranium-238	0.533		0.660	0.662		0.474	pCi/g	12/08/20 14:09	12/29/20 10:04	1

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QC Sample Results

Page 75 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-491323/23-A

Matrix: Solid

Analysis Batch: 492430

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491323

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.					
Strontium-90	0.07392	U		0.140	0.140	0.331	pCi/g	12/09/20 18:42	12/18/20 20:20	1
Carrier										
Sr Carrier	MB		MB		%Yield		Qualifier		Limits	
	100				40 - 110					
Y Carrier	%		%		%		%		%	
	92.7				40 - 110					

Lab Sample ID: LCS 160-491323/1-A

Matrix: Solid

Analysis Batch: 492430

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 491323

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	%Rec.	Limits	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.					
Strontium-90	7.76			5.897	0.638	0.331	pCi/g	76	75 - 125	
Carrier										
Sr Carrier	LCS		LCS		Spike		LCS		LCS	
	100				40 - 110	Added	Result	Qual		
Y Carrier	%		%		%		%		%	
	99.8				40 - 110					

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-491176/1-A

Matrix: Solid

Analysis Batch: 493212

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491176

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Uncert.		(2σ+/-)	Uncert.						
Actinium 228	0.05275			0.130	0.130	0.0292	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Actinium-227	0.1255	U		0.222	0.222	0.169	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Bismuth-212	-0.1593	U		0.348	0.348	0.550	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Bismuth-214	-0.06394	U		0.0759	0.0762	0.121	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Cesium-137	-0.01337	U		0.0423	0.0423	0.0331	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Lead-210	-0.4619	U		1.04	1.04	0.821	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Lead-212	-0.04586	U		0.0768	0.0771	0.0732	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Lead-214	-0.003728	U		0.00986	0.00987	0.0710	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Potassium-40	-0.1504	U		0.693	0.693	0.433	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Protactinium-231	0.0000	U		0.422	0.422	1.53	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Protactinium-234	0.1023	U		0.0617	0.0626	0.144	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Radium-226	-0.06394	U		0.0759	0.0762	0.200	0.121	pCi/g	12/08/20 13:20	12/29/20 12:29	1
Radium-228	0.05275			0.130	0.130	0.0292	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Thallium-208	0.02545			0.0253	0.0255	0.0139	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Thorium 228	-0.04586	U		0.0768	0.0771	0.0732	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Thorium-232	0.05275			0.130	0.130	0.0292	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Thorium-234	0.0000	U		0.124	0.124	0.481	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Uranium-235	0.04560	U		0.188	0.188	0.271	pCi/g	12/08/20 13:20	12/29/20 12:29	1	
Uranium-238	0.0000	U		0.124	0.124	0.481	pCi/g	12/08/20 13:20	12/29/20 12:29	1	

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QC Sample Results

Page 76 of 95

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
 SDG: GJ46599741

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-491176/2-A

Matrix: Solid

Analysis Batch: 493213

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 491176

Analyte	Spike Added	Total				%Rec.	Limits	
		LCS Result	LCS Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit	
Americium-241	96.4	92.41		9.78		0.699	pCi/g	96 87 - 116
Cesium-137	26.7	25.61		2.76	0.0700	0.121	pCi/g	96 87 - 120
Cobalt-60	9.41	9.465		1.02		0.0598	pCi/g	101 87 - 115

Lab Sample ID: 160-40635-20 DU

Matrix: Solid

Analysis Batch: 493373

Client Sample ID: HPPG-ESU-TU077B-020

Prep Type: Total/NA

Prep Batch: 491176

Analyte	Sample	Sample	Total				RER	Limit		
	Result	Qual	DU Result	DU Qual	Uncert. (2σ+/-)	LOQ	DLC	Unit		
Actinium 228	0.163		0.6143		0.226		0.0428	pCi/g	0.92	1
Actinium-227	0.0263	U	0.1667	U	0.424		0.376	pCi/g	0.30	1
Bismuth-212	-0.0386	U	0.0000	U	0.397		1.01	pCi/g	0.03	1
Bismuth-214	0.375		0.5055		0.240		0.102	pCi/g	0.32	1
Cesium-137	-0.0748	U	0.04460	U	0.101	0.0700	0.0798	pCi/g	0.72	1
Lead-210	-0.805	U	-0.5135	U	1.73		1.44	pCi/g	0.08	1
Lead-212	0.506		0.5170		0.170		0.0695	pCi/g	0.04	1
Lead-214	0.371		0.2219		0.158		0.112	pCi/g	0.50	1
Potassium-40	9.35		7.478		1.72		0.319	pCi/g	0.49	1
Protactinium-231	0.000	U	-1.175	U	3.59		2.92	pCi/g	0.29	1
Protactinium-234	0.0825	U	0.02314	U	0.0371		0.312	pCi/g	0.36	1
Radium-226	0.375		0.5055		0.240	0.200	0.102	pCi/g	0.32	1
Radium-228	0.163		0.6143		0.226		0.0428	pCi/g	0.92	1
Thallium-208	0.195		0.1665		0.0615		0.0198	pCi/g	0.22	1
Thorium 228	0.506		0.5170		0.170		0.0695	pCi/g	0.04	1
Thorium-232	0.163		0.6143		0.226		0.0428	pCi/g	0.92	1
Thorium-234	0.857		-1.040	U	1.06		1.39	pCi/g	1.18	1
Uranium-235	0.0963	U	0.2149	U	0.608		0.494	pCi/g	0.13	1
Uranium-238	0.857		-1.040	U	1.06		1.39	pCi/g	1.18	1

Lab Sample ID: MB 160-491180/1-A

Matrix: Solid

Analysis Batch: 493217

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491180

Analyte	MB	MB	Count		Total		Prepared	Analyzed	Dil Fac	
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	LOQ	DLC	Unit			
Actinium 228	-0.08901	U	0.164	0.164		0.140	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Actinium-227	0.02924	U	0.0896	0.0897		0.297	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Bismuth-212	-0.03906	U	0.370	0.370		0.850	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Bismuth-214	0.08648	U	0.0654	0.0660		0.146	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Cesium-137	-0.009708	U	0.0706	0.0706	0.0700	0.0572	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Lead-210	0.5110	U	1.35	1.35		0.927	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Lead-212	-0.02045	U	0.0776	0.0776		0.0650	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Lead-214	-0.1161	U	0.188	0.189		0.117	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Potassium-40	-0.03970	U	0.463	0.463		0.380	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Protactinium-231	0.0000	U	0.192	0.192		1.77	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Protactinium-234	-0.06706	U	0.166	0.166		0.133	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Radium-226	0.08648	U	0.0654	0.0660	0.200	0.146	pCi/g	12/08/20 14:09	12/29/20 09:14	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Page 77 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-491180/1-A

Matrix: Solid

Analysis Batch: 493217

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491180

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Radium-228	-0.08901	U		0.164	0.164		0.164	0.140	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thallium-208	0.003662	U		0.00788	0.00789		0.00789	0.0362	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thorium 228	-0.02045	U		0.0776	0.0776		0.0776	0.0650	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thorium-232	-0.08901	U		0.164	0.164		0.164	0.140	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thorium-234	0.3269			0.465	0.466		0.466	0.311	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Uranium-235	-0.1266	U		0.280	0.280		0.280	0.222	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Uranium-238	0.3269			0.465	0.466		0.466	0.311	pCi/g	12/08/20 14:09	12/29/20 09:14	1

Lab Sample ID: LCS 160-491180/2-A

Matrix: Solid

Analysis Batch: 493308

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 491180

Analyte	Spike Added	LCS Result	LCS Qual	Total		LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert.	(2σ+/-)					
Americium-241	96.4	96.36		11.3			0.501	pCi/g	100	87 - 116
Cesium-137	26.7	28.79		3.03		0.0700	0.0890	pCi/g	108	87 - 120
Cobalt-60	9.41	9.453		1.01			0.0389	pCi/g	100	87 - 115

QC Association Summary

Page 78 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Rad

Leach Batch: 490914

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40635-1	HPPG-ESU-TU077B-001	Total/NA	Solid	Dry and Grind	
160-40635-2	HPPG-ESU-TU077B-002	Total/NA	Solid	Dry and Grind	
160-40635-3	HPPG-ESU-TU077B-003	Total/NA	Solid	Dry and Grind	
160-40635-4	HPPG-ESU-TU077B-004	Total/NA	Solid	Dry and Grind	
160-40635-5	HPPG-ESU-TU077B-005	Total/NA	Solid	Dry and Grind	
160-40635-6	HPPG-ESU-TU077B-006	Total/NA	Solid	Dry and Grind	
160-40635-7	HPPG-ESU-TU077B-007	Total/NA	Solid	Dry and Grind	
160-40635-8	HPPG-ESU-TU077B-008	Total/NA	Solid	Dry and Grind	
160-40635-9	HPPG-ESU-TU077B-009	Total/NA	Solid	Dry and Grind	
160-40635-10	HPPG-ESU-TU077B-010	Total/NA	Solid	Dry and Grind	
160-40635-11	HPPG-ESU-TU077B-011	Total/NA	Solid	Dry and Grind	
160-40635-12	HPPG-ESU-TU077B-012	Total/NA	Solid	Dry and Grind	
160-40635-13	HPPG-ESU-TU077B-013	Total/NA	Solid	Dry and Grind	
160-40635-14	HPPG-ESU-TU077B-014	Total/NA	Solid	Dry and Grind	
160-40635-15	HPPG-ESU-TU077B-015	Total/NA	Solid	Dry and Grind	
160-40635-16	HPPG-ESU-TU077B-016	Total/NA	Solid	Dry and Grind	
160-40635-17	HPPG-ESU-TU077B-017	Total/NA	Solid	Dry and Grind	
160-40635-18	HPPG-ESU-TU077B-018	Total/NA	Solid	Dry and Grind	

Leach Batch: 490916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40635-19	HPPG-ESU-TU077B-019	Total/NA	Solid	Dry and Grind	
160-40635-20	HPPG-ESU-TU077B-020	Total/NA	Solid	Dry and Grind	
160-40635-21	HPPG-ESU-TU077B-021	Total/NA	Solid	Dry and Grind	
160-40635-22	HPPG-ESU-TU077B-022	Total/NA	Solid	Dry and Grind	
160-40635-23	HPPG-ESU-TU077B-023	Total/NA	Solid	Dry and Grind	
160-40635-24	HPPG-ESU-TU077B-024	Total/NA	Solid	Dry and Grind	
160-40635-25	HPPG-ESU-TU077B-025	Total/NA	Solid	Dry and Grind	
160-40635-26	HPPG-F-051	Total/NA	Solid	Dry and Grind	
160-40635-27	HPPG-F-052	Total/NA	Solid	Dry and Grind	
160-40635-20 DU	HPPG-ESU-TU077B-020	Total/NA	Solid	Dry and Grind	

Prep Batch: 491176

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40635-1	HPPG-ESU-TU077B-001	Total/NA	Solid	Fill_Geo-21	490914
160-40635-2	HPPG-ESU-TU077B-002	Total/NA	Solid	Fill_Geo-21	490914
160-40635-3	HPPG-ESU-TU077B-003	Total/NA	Solid	Fill_Geo-21	490914
160-40635-4	HPPG-ESU-TU077B-004	Total/NA	Solid	Fill_Geo-21	490914
160-40635-5	HPPG-ESU-TU077B-005	Total/NA	Solid	Fill_Geo-21	490914
160-40635-6	HPPG-ESU-TU077B-006	Total/NA	Solid	Fill_Geo-21	490914
160-40635-7	HPPG-ESU-TU077B-007	Total/NA	Solid	Fill_Geo-21	490914
160-40635-8	HPPG-ESU-TU077B-008	Total/NA	Solid	Fill_Geo-21	490914
160-40635-9	HPPG-ESU-TU077B-009	Total/NA	Solid	Fill_Geo-21	490914
160-40635-10	HPPG-ESU-TU077B-010	Total/NA	Solid	Fill_Geo-21	490914
160-40635-11	HPPG-ESU-TU077B-011	Total/NA	Solid	Fill_Geo-21	490914
160-40635-12	HPPG-ESU-TU077B-012	Total/NA	Solid	Fill_Geo-21	490914
160-40635-13	HPPG-ESU-TU077B-013	Total/NA	Solid	Fill_Geo-21	490914
160-40635-14	HPPG-ESU-TU077B-014	Total/NA	Solid	Fill_Geo-21	490914
160-40635-15	HPPG-ESU-TU077B-015	Total/NA	Solid	Fill_Geo-21	490914
160-40635-16	HPPG-ESU-TU077B-016	Total/NA	Solid	Fill_Geo-21	490914
160-40635-17	HPPG-ESU-TU077B-017	Total/NA	Solid	Fill_Geo-21	490914

Eurofins TestAmerica, St. Louis

QC Association Summary

Page 79 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Rad (Continued)

Prep Batch: 491176 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40635-18	HPPG-ESU-TU077B-018	Total/NA	Solid	Fill_Geo-21	490914
160-40635-19	HPPG-ESU-TU077B-019	Total/NA	Solid	Fill_Geo-21	490916
160-40635-20	HPPG-ESU-TU077B-020	Total/NA	Solid	Fill_Geo-21	490916
MB 160-491176/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-491176/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40635-20 DU	HPPG-ESU-TU077B-020	Total/NA	Solid	Fill_Geo-21	490916

Prep Batch: 491180

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40635-21	HPPG-ESU-TU077B-021	Total/NA	Solid	Fill_Geo-21	490916
160-40635-22	HPPG-ESU-TU077B-022	Total/NA	Solid	Fill_Geo-21	490916
160-40635-23	HPPG-ESU-TU077B-023	Total/NA	Solid	Fill_Geo-21	490916
160-40635-24	HPPG-ESU-TU077B-024	Total/NA	Solid	Fill_Geo-21	490916
160-40635-25	HPPG-ESU-TU077B-025	Total/NA	Solid	Fill_Geo-21	490916
160-40635-26	HPPG-F-051	Total/NA	Solid	Fill_Geo-21	490916
160-40635-27	HPPG-F-052	Total/NA	Solid	Fill_Geo-21	490916
MB 160-491180/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-491180/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 491323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40635-1	HPPG-ESU-TU077B-001	Total/NA	Solid	DPS-7	490914
160-40635-11	HPPG-ESU-TU077B-011	Total/NA	Solid	DPS-7	490914
160-40635-21	HPPG-ESU-TU077B-021	Total/NA	Solid	DPS-7	490916
MB 160-491323/23-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-491323/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Tracer/Carrier Summary

Page 80 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40635-1
SDG: GJ46599741

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)		
		Sr (40-110)	Y (40-110)	
160-40635-1	HPPG-ESU-TU077B-001	88.2	92.7	
160-40635-11	HPPG-ESU-TU077B-011	91.4	94.2	
160-40635-21	HPPG-ESU-TU077B-021	103	94.2	
LCS 160-491323/1-A	Lab Control Sample	100	99.8	
MB 160-491323/23-A	Method Blank	100	92.7	

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier



Environment Testing America



ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40636-1
Laboratory Sample Delivery Group: D1189451
Client Project/Site: HPNS-Parcel G 501197

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
1/6/2021 11:11:45 PM
Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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Ask
The
Expert

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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11

12

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	12
QC Association Summary	14
Tracer Carrier Summary	15

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 83 of 95

Job ID: 160-40636-1
SDG: D1189451

Job ID: 160-40636-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40636-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 12/03/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at

Case Narrative

Page 84 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40636-1
SDG: D1189451

Job ID: 160-40636-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

receipt was 9.4 C.

STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU077B-B-001 (160-40636-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 12/04/2020, prepared on 12/09/2020 and analyzed on 12/18/2020.

The following samples could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: HPPG-ESU-TU077B-B-001 (160-40636-1) and (160-40636-A-1-A DU). The samples contained rocks of varying sizes.

The method blank (MB) z-score is within limits and is stored in the level IV raw data. (MB 160-491323/23-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU077B-B-001 (160-40636-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 12/04/2020, prepared on 12/08/2020 and analyzed on 12/29/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-491180 is within limits and is stored in the level IV raw data. (MB 160-491180/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-050

Page 1 of 2

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercic
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwv

Sample Lead: Lewis, Devin
Sample Tech(s): Andrew Murri

Project Number: 501197

Project Name: G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1158058

Shipment/Pickup Date: 12/22/2020

Waybill Number: 4157 0225 6137

Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma		Strontium-90 (EPA 905 MOD)		Analysis Requested	
# of Containers	Preservatives (water)				
Matrix	Preservatives (soil)				
Method	Container Type				
G	16 oz. plastic jar	X	X		
SO					
1					

Special Instructions:

21 day ingrowth results only

Turaround Time:	3-day <input type="checkbox"/>	10-Day <input type="checkbox"/>	28-day <input type="checkbox"/>	Other <input type="checkbox"/>	Level of QC Required:	I	II	III	Project Specific
Method Codes C = Composite G = Grab	Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Clip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening								
Relinquished By:	Relinquisher Signature: Received By: Received Date Time: Received Signature:								
Lewis, Devin		12/02/2020 15:43	SHIPPEDTO LAB		12/3/20 09:50				

*** Last 3 transfers shown above - Complete list of transfers on last page ***



160-40636 Chain of Custody

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All Transfers for COC 501197RSY-050

Page 2 of 2					
Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		12/02/2020 15:43	SHIPPEDTOLAB		

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40636-1
SDG Number: D1189451**Login Number: 40636****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Greer, Diane A**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 88 of 95

Job ID: 160-40636-1
SDG: D1189451

Qualifiers

Rad

Qualifier

Qualifier Description

U Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

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12

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 89 of 95

Job ID: 160-40636-1
SDG: D1189451

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 90 of 95

Job ID: 160-40636-1
SDG: D1189451

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40636-1	HPPG-ESU-TU077B-B-001	Solid	12/02/20 13:55	12/03/20 09:55	

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Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 91 of 95

Job ID: 160-40636-1
SDG: D1189451

Client Sample ID: HPPG-ESU-TU077B-B-001

Lab Sample ID: 160-40636-1

Matrix: Solid

Date Collected: 12/02/20 13:55
Date Received: 12/03/20 09:55

Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0157	U	0.141	0.141	0.331	0.117	pCi/g	12/09/20 18:42	12/18/20 20:20	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	97.5		40 - 110					12/09/20 18:42	12/18/20 20:20	1
Y Carrier	95.3		40 - 110					12/09/20 18:42	12/18/20 20:20	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.520		0.135	0.145		0.0561	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Actinium-227	-0.0397	U	0.550	0.550		0.323	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Bismuth-212	0.0304	U	0.715	0.715		0.586	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Bismuth-214	0.248		0.0993	0.103		0.102	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Cesium-137	-0.0378	U	0.0622	0.0623	0.0700	0.0482	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Lead-210	1.15		1.32	1.33		0.829	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Lead-212	0.411		0.0843	0.0997		0.0412	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Lead-214	0.497		0.108	0.120		0.0473	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Potassium-40	8.89		1.28	1.57		0.274	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Protactinium-231	0.000	U	0.439	0.439		2.05	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Protactinium-234	0.0152	U	0.0283	0.0283		0.180	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Radium-226	0.248		0.0993	0.103	0.200	0.102	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Radium-228	0.520		0.135	0.145		0.0561	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Thallium-208	0.170		0.0642	0.0666		0.0292	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Thorium 228	0.411		0.0843	0.0997		0.0412	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Thorium-232	0.520		0.135	0.145		0.0561	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Thorium-234	0.261	U	0.427	0.428		0.334	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Uranium-235	0.0722	U	0.273	0.273		0.253	pCi/g	12/08/20 14:09	12/29/20 09:56	1
Uranium-238	0.261	U	0.427	0.428		0.334	pCi/g	12/08/20 14:09	12/29/20 09:56	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Page 92 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40636-1
SDG: D1189451

Method: 905 - Strontium-90 (GFPC)

Lab Sample ID: MB 160-491323/23-A

Matrix: Solid

Analysis Batch: 492430

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491323

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	Uncert.					
Strontium-90	0.07392	U		0.140	0.140	0.331	pCi/g	12/09/20 18:42	12/18/20 20:20	1
Carrier										
Sr Carrier	MB	MB	Qualifier	Limits		Prepared	Analyzed	Dil Fac		
	%Yield			40 - 110						
Y Carrier	100			40 - 110		12/09/20 18:42	12/18/20 20:20	1		
	92.7									

Lab Sample ID: LCS 160-491323/1-A

Matrix: Solid

Analysis Batch: 492430

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 491323

Analyte	MB	MB	Qualifier	Spike	LCS	LCS	DLC	Unit	%Rec.	Total					
	Result	Uncert.		(2σ+/-)	Result	Qual									
Strontium-90	0.07392	U		7.76	5.897		0.638	0.331	0.109	pCi/g					
Carrier															
Sr Carrier	MB	MB	Qualifier	Limits		Prepared	Analyzed	Dil Fac							
	%Yield			40 - 110											
Y Carrier	100			40 - 110											
	99.8														

Lab Sample ID: 160-40636-1 DU

Matrix: Solid

Analysis Batch: 492430

Client Sample ID: HPPG-ESU-TU077B-B-001

Prep Type: Total/NA

Prep Batch: 491323

Analyte	Sample	Sample	DU	DU	DLC	Unit	RER	Limit			
	Result	Qual		Result							
Strontium-90	-0.0157	U		0.1127	0.134	0.331	0.0999	pCi/g			
Carrier											
Sr Carrier	DU	DU	Qualifier	Limits		Prepared	Analyzed	Dil Fac			
	%Yield			40 - 110							
Y Carrier	101			40 - 110							
	94.2										

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-491180/1-A

Matrix: Solid

Analysis Batch: 493217

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491180

Analyte	MB	MB	Qualifier	Count	Total	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Uncert.		(2σ+/-)	(2σ+/-)					
Actinium 228	-0.08901	U		0.164	0.164	0.140	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Actinium-227	0.02924	U		0.0896	0.0897	0.297	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Bismuth-212	-0.03906	U		0.370	0.370	0.850	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Bismuth-214	0.08648	U		0.0654	0.0660	0.146	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Cesium-137	-0.009708	U		0.0706	0.0706	0.0572	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Lead-210	0.5110	U		1.35	1.35	0.927	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Lead-212	-0.02045	U		0.0776	0.0776	0.0650	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Lead-214	-0.1161	U		0.188	0.189	0.117	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Potassium-40	-0.03970	U		0.463	0.463	0.380	pCi/g	12/08/20 14:09	12/29/20 09:14	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Page 93 of 95

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40636-1
SDG: D1189451

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-491180/1-A

Matrix: Solid

Analysis Batch: 493217

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 491180

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Protactinium-231	0.0000	U		0.192		0.192		1.77	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Protactinium-234	-0.06706	U		0.166		0.166		0.133	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Radium-226	0.08648	U		0.0654		0.0660		0.200	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Radium-228	-0.08901	U		0.164		0.164		0.140	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thallium-208	0.003662	U		0.00788		0.00789		0.0362	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thorium 228	-0.02045	U		0.0776		0.0776		0.0650	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thorium-232	-0.08901	U		0.164		0.164		0.140	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Thorium-234	0.3269			0.465		0.466		0.311	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Uranium-235	-0.1266	U		0.280		0.280		0.222	pCi/g	12/08/20 14:09	12/29/20 09:14	1
Uranium-238	0.3269			0.465		0.466		0.311	pCi/g	12/08/20 14:09	12/29/20 09:14	1

Lab Sample ID: LCS 160-491180/2-A

Matrix: Solid

Analysis Batch: 493308

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 491180

Analyte	Spike Added	LCS Result	LCS Qual	Total				%Rec.	Limits
				Uncert.	(2σ+/-)	LOQ	DLC		
Americium-241	96.4	96.36		11.3			0.501	pCi/g	100 87 - 116
Cesium-137	26.7	28.79		3.03		0.0700	0.0890	pCi/g	108 87 - 120
Cobalt-60	9.41	9.453		1.01			0.0389	pCi/g	100 87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 94 of 95

Job ID: 160-40636-1
SDG: D1189451

Rad

Leach Batch: 490916

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40636-1	HPPG-ESU-TU077B-B-001	Total/NA	Solid	Dry and Grind	
160-40636-1 DU	HPPG-ESU-TU077B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 491180

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40636-1	HPPG-ESU-TU077B-B-001	Total/NA	Solid	Fill_Geo-21	490916
MB 160-491180/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-491180/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 491323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40636-1	HPPG-ESU-TU077B-B-001	Total/NA	Solid	DPS-7	490916
MB 160-491323/23-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-491323/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	
160-40636-1 DU	HPPG-ESU-TU077B-B-001	Total/NA	Solid	DPS-7	490916

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Page 95 of 95

Job ID: 160-40636-1
SDG: D1189451

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)									
160-40636-1	HPPG-ESU-TU077B-B-001	97.5	95.3									
160-40636-1 DU	HPPG-ESU-TU077B-B-001	101	94.2									
LCS 160-491323/1-A	Lab Control Sample	100	99.8									
MB 160-491323/23-A	Method Blank	100	92.7									

Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier